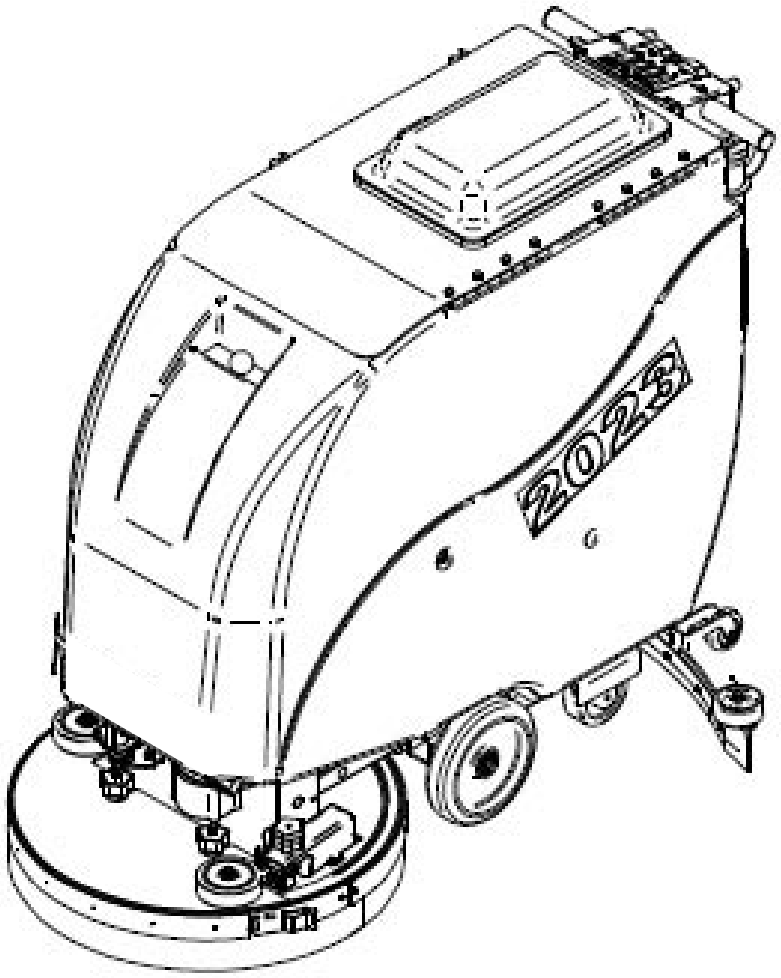
Version 1.0

SERVICE MANUAL

2023 SERIES



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CAUTION!

To reduce the chance of personal injury and/or property damage, the following instructions must be careful observed:

Proper service and repair are important to the safety of the service technician and the safe reliable operation of all cleaning equipment. If part replacement is necessary, the part must be replaced with one of the same part number or with an equivalent part. Do not use replacement parts of lesser quality

The service procedures recommended and described in this service manual are effective methods of performing service and repair. Some of these procedures require the use of tools specifically designed for the purpose.

Accordingly anyone who intends to use a replacement part, service procedure or tool which is not recommended by the equipment manufacturer, must determine that neither his safety nor the safe operation of the equipment will be jeopardized by the replacement part, service procedure or tool selected.

It is important to note that this manual contains various cautions and notices that must be carefully observed in order to reduce the risk of personal injury during service or repair, or the possibility that improper service or repair may damage the piece of equipment or render it unsafe. It is also important to note that these ‘Cautions’ and ‘Notices’ are not exhaustive, because it is impossible to warn of all the possible hazardous consequences that might result from failure to follow these instructions.

FOREWORD

R.P.S. Corporation service manuals are intended for use by professional, qualified technicians. Attempting repairs or service without the appropriate training, tools, and equipment could cause injury to you or others and damage to your piece of equipment that may cause it not to operate properly

This manual should be kept in a convenient place for easy reference. When properly used, it will meet the needs of technicians and equipment owners.

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As our policy is one of constant improvement, all specifications are subject to change without notice.

SAFETY MESSAGE

Your safety and the safety of others is very important and operating this unit safely is an important responsibility.

To help you make informed decisions about safety, we have provided operation procedures and other safety information in this manual. This information informs you of potential hazards that could hurt you or others.

It is not practical or possible to warn you of all the hazards associated with operating this unit. You must use your own good judgement.

This is intended for commercial use. It is designed to be used on hard floors only and in an indoor environment, with the recommended pads and brushes with approved cleaning solutions.

DO NOT OPERATE THE UNIT:

- UNLESS TRAINED AND AUTHORIZED.
- UNLESS OPERATOR MANUAL IS READ AND UNDERSTOOD.
- IF UNIT IS NOT IN PROPER OPERATING CONDITION.

WHEN OPERATING UNIT:

- WEAR PROPER PROTECTIVE EQUIPMENT.
- REMOVE LOOSE OBJECTS FROM THE FLOOR THAT MAY BE PROJECTED FROM THE REVOLVING BRUSHES.
- DO NOT OPERATE THE MACHINE WHERE FLAMMABLE LIQUIDS OR GASES ARE PRESENT.
- USE EXTREME CAUTION WHEN MANEUVERING.
- MAKE SURE ALL PERSONS ARE A SAFE DISTANCE FROM THE MACHINE WHILE IN OPERATION.

BEFORE LEAVING THE UNIT:

- MAKE SURE MACHINE IS TURNED OFF.
- PARK MACHINE ON A LEVEL SURFACE.
- DISCONNECT BATTERIES.

BEFORE SERVICING:

- STOP ON A LEVEL SURFACE AND SECURE MACHINE.
- DISCONNECT BATTERIES.

SAFETY PRECAUTIONS

- Hazardous voltage. Shock, Burns or electrocution can result. ALWAYS disconnect the batteries before servicing machine.
- Batteries emit hydrogen gases, explosion or fire can result. Keep sparks and open flame away.!
- Charge unit in a well ventilated area and keep battery compartment open when charging or explosion or fire could result.
- Battery acid can cause burns. Wear protective face-shield and gloves when servicing batteries.
- Do not store outdoors or pressure wash. Prevent from getting electrical components wet.
- The use of parts and solutions other than recommended by the manufacturer may cause property damage, bodily injury or death to yourself or others.
- Dress safely. Do not wear rings, watches or other jewelry while working on this machine. They can cause an electrical short which can cause serious burns, other injury or death.
- Do not work on this machine while wearing a tie, scarf, hat or any other loose or dangling neck wear or clothing. Loose clothing can tangle or catch on rotating parts causing serious injury or death.
- Do not use this machine as a ladder or a chair.
- Operate this machine only from the operators position.
- This machine was not designed to carry passengers or transport cargo.
- Do not operate this machine on steep ramps or uneven surfaces. When climbing a ramp always drive the machine forward straight up or down the ramp. Never drive across the incline.
- Do not back down or turn on ramps!
- Always use the charger provided by the manufacturer to charge the machine. It is an automatic charger specifically designed to charge at the appropriate rate. If you must use a different charger, disconnect the batteries from the machine as this will protect the on-board electronics.
- Understand the dynamic breaking system before you operate the machine on ramps or slopes.
- Do not park the machine on ramps or slopes
- Do not operate the machine if any parts have been removed or damaged.
- Do not remove, paint over, or destroy warning decals. If warning decals become damaged they must be replaced.
- Do not operate machine in an unsafe condition. If the machine is need of repair or is in anyway unsafe to operate, the matter should be reported immediately to the shift supervisor. Do not operate the machine until it is returned to proper operating condition.
- This machine must be operated only by a trained operator. As part of their training they must read the operators manual thoroughly. If extra copies are needed contact your local dealer.
- Always park machine on a level surface and turn the power off before leaving it unattended.
- Do not operate over electrical floor outlets. This may result in serious injury or death to the operator and others.
- Do not work under machine without it properly supported on suitable safety stands.
- Do not try and lift this machine unaided it is very heavy.
- Do not use handle bars or steering mechanism as a lifting point

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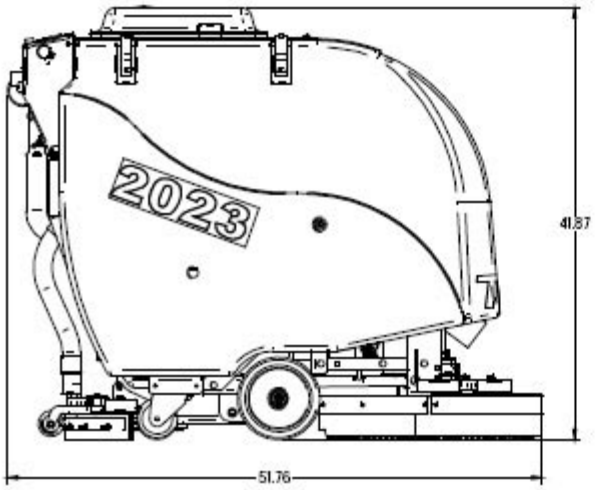
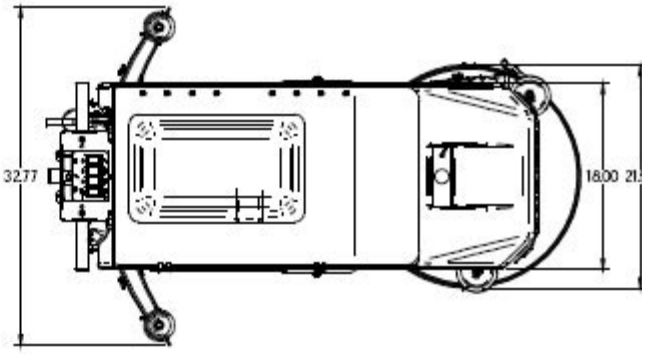
SPECIFICATIONS



RIGHT SIDE VIEW



TOP VIEW

Machine Length	51 3/4 in.	(132cm)
Machine Height	42 7/8 in.	(109cm)
Machine Chassis Width	18.00 in.	(46 cm)
Machine Current Consumption (Average)	47 Amps	Brush Motor: Up to 30 Amps Vacuum Motor: Up to 30 Amps
Solution Tank Capacity	19 Gallons	(72 liters)
Recovery Tank Capacity	19 Gallons	(72 liters)
Solution Flow Rate	0 - 2 GPM	(0 - 7.56 liters/min)
Operating Noise Level (at operator)	70 dB(A)	
Forward Scrub Speed	0 - 300 ft.min (4 1/2) mph	(0- 92 meters / min (7.5 kph))
Vacuum Motor (3 Stage)	.75 hp (660 watt)	
Water lift	68”	
Airflow	72 cfm	
Power Source (Batteries)		
2023		
Standard	(2) 12 Volt / 140 amp hour capacity	
Weight (Each)	66 lbs. (30 kg)	
High Capacity	(2) 12 Volt / 205 amp hour capacity	
Weight (Each)	122 lbs. (56kg)	
Battery Compartment Size		
Height	13 in.	(33 cm)
Width	14 in.	(35.5 cm)
Length	17 in.	(43 cm)
Estimated Battery Run Time	Up to 4 hrs.	
Battery Charger	24 Volt / 18 amp	

SPECIFICATIONS

	2023-20	2023-20HD	2023-23
Machine Width with Squeegee	32 3/4 in. 83 cm	32 3/4 in. 83 cm	32 3/4 in. 83 cm
Scrub Brush Size (qty. 1)	20 in. 51 cm	20 in. 51 cm	23 in. 59 cm
Scrub Brush Motor (qty. 1)	.75 hp	1.0 hp	1.0 hp
Scub Brush Speed	200 rpm	200 rpm	200 rpm
Machine Net Weight *	334 lbs. 148 kg.	334 lbs. 148 kg.	352 lbs. 160 kg.
Machine Gross Weight **	458 lbs. 208 kg.	458 lbs. 208 kg.	484 lbs. 220 kg.
Cleaning Width	20 in. 51 cm	20 in. 51 cm	23in. 59 cm
Cleaning Rate Per Hour	19,842 sq. ft./hour 1843 sq. meters./hour	19,842 sq. ft./hour 1843 sq. meters./hour	22,491 sq. ft./hour 2090 sq. meters./hour

* NET WEIGHT: Standard equipped machine with no options installed. Empty recovery and solution tanks and no batteries, pad holder or scrub brush.

** GROSS WEIGHT: Standard equipped machine with no options installed. Full solution and empty recovery tank. Standard pad holder or scrub brush and standard batteries.

MAINTENANCE

MAINTENANCE SCHEDULE

MAINTENANCE SCHEDULE	DAILY	WEEKLY	MONTHLY	EVERY 200 HRS
Charge the batteries	X			
Inspect pad or brush condition	X			
Drain and clean out tanks and hoses	X			
Clean float screen & drain saver in recovery tank	X			
Remove and clean squeegee tool. Inspect for wear or damage.	X			
Wipe down outside of machine	X			
Check battery electrolyte level in all cells		X		
Check all skirts and wipers on machine		X		
Check batteries and terminals for irregularities		X		
Lubricate machine			X	
Check carbon brushes on motors				X
Blow out dust from motors			X	

ATTENTION!

Make sure machine is turned off and the batteries are disconnected before performing any repairs or service on the machine!

Your machine is equipped with two brush-type motors that require periodic inspection to assess wear. Failure to inspect on regular intervals can result in motor damage that is not covered under warranty.

LUBRICATION

The machine requires periodic lubrication on each grease fitting on the machine and oiling of some pivot points and threads. Once a month is generally acceptable unless the machine is used in a severe duty application.

The grease fittings are located on:
Rear casters

The following points to be oiled lightly are:
Squeegee knob threads
Squeegee adjustment threads
Squeegee pivot points
Brush head pivot points

2023 Series

PREVENTIVE MAINTENANCE WORKSHEET

CUSTOMER INFORMATION		
CUSTOMER		
ADDRESS		
CITY	STATE	ZIP CODE

MACHINE INFORMATION	
MODEL #	SERIAL #
WORK ORDER#	HOUR METER:

BATTERY CONDITION		Cell #1	Cell #2	Cell #3	Cell #4	Cell #5	Cell #6
Battery # 1 Hydrometer							
Battery # 1 Water Condition							
Battery # 2 Hydrometer							
Battery # 2 Water condition							

Clean Battery Tops. Check Battery Cable and Terminal Condition
NOTES:

BRUSH CONDITION		
Fiber Length		
Drive Socket		
Drive Hub		

CHECK OPERATION AND CONDITION OF:	IN SPEC	REPAIR	PROBLEM
Main Power Switch			
Battery Gauge			
Handle Bar Switch			
Brush Actuator Switch (Up & Down)			
Brush Motor Switch			
Brush Down Pressure Gauge			
Brush Motor			
Solution Switch			
Solution Solenoid			
Vacuum Switch			
Vacuum Motor performance			
Squeegee Lift System			
Squeegee Adjustment			
Battery Charger Connectors			
Battery Charger			

2023 Series

PREVENTIVE MAINTENANCE WORKSHEET

CLEAN AND/OR LUBRICATE	IN SPEC	REPAIR	PROBLEM
Solution Filter			
Squeegee pivot points & Knobs			
Scrub Deck Linkage			

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VISUALLY INSPECT:	IN SPEC	REPAIR	PROBLEM
Solution Tank Condition			
Recovery Tank & Lid Condition			
Drain Saver			
Vacuum float			
Vacuum Motor Brushes			
Vacuum Hoses			
Solution Hoses			
Squeegee tool and throat			
Squeegee blades			
Blade retainers & hardware			
Squeegee Wheels			
Brush skirts			
Brush Motor Brushes			
Brush or Pad Driver Condition			
Wheel Condition			
Caster Condition			

Techinican's Name _____ Customer's Name: _____

Technician's Signature _____ Customer's Signature _____

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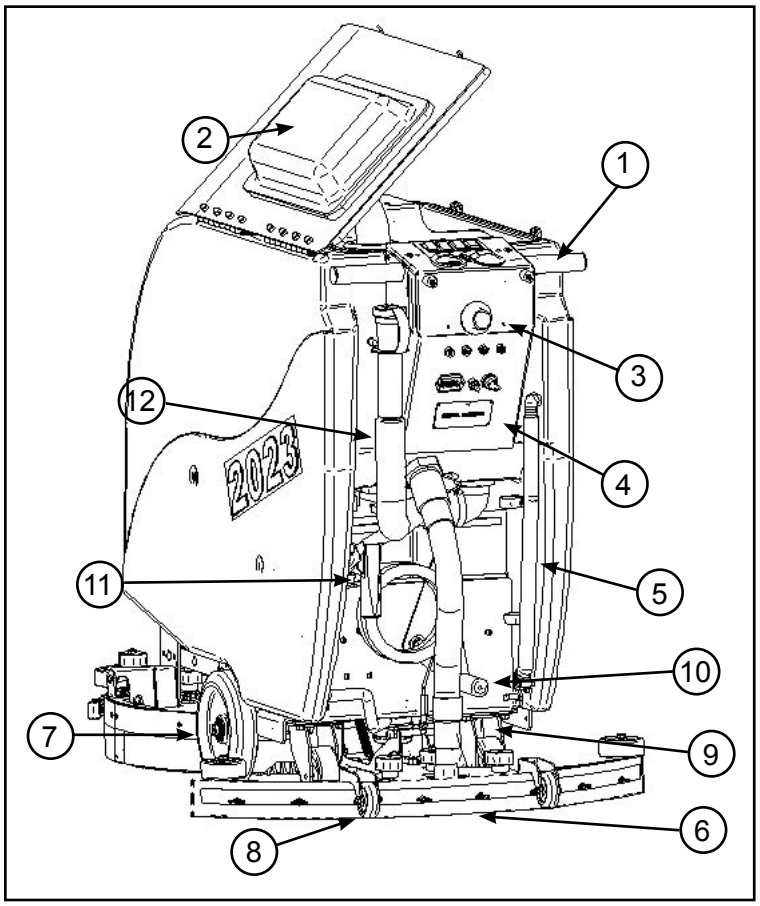
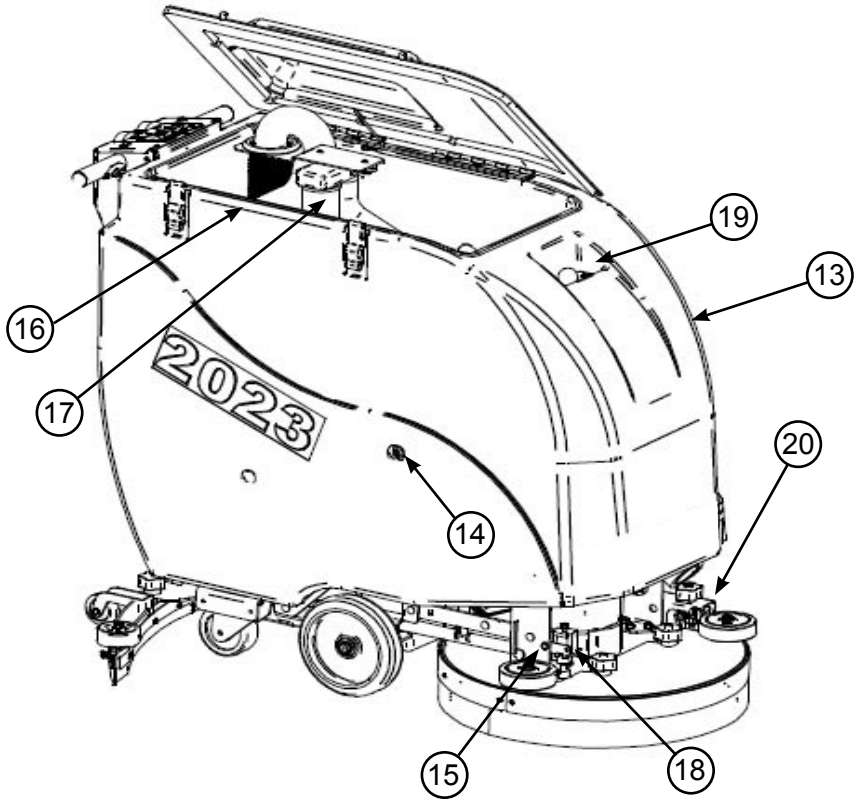
MACHINE PARTS



1. HANDLE BARS
2. RECOVERY LID
3. CONTROL PANEL
4. CIRCUIT BREAKERS
5. SOLUTION GAUGE/DRAIN
6. SQUEEGEE ASSEMBLY
7. FRONT WHEELS
8. REAR CASTERS
9. SOLUTION FILTER
10. SQUEEGEE LIFT
11. CHARGER PORT
12. RECOVERY DRAIN HOSE

13. SOLUTION TANK
14. BODY LOCK DOWN SCREW
15. BODY ALLEN WRENCH
16. DRAIN SAVER SCREEN
17. VACUUM FLOAT AND SCREEN
18. SOLUTION VALVE
19. SOLUTION FILL
20. BRUSH DRIVE ADJUSTER



MAIN COMPONENTS

Handle Bars (1) - The handle bars are located at the back of the machine and have a green button on the right side handle. When the green button is depressed it turns on the brush motor and solution flow if the control panel switches are turned on.

Recovery Tank Lid (2) - The recovery tank lid is equipped with a clear dome to allow you to see the condition of the recovery tank while in use. You are able to observe both the recovery water level as well as observe if their is foam accumulating in the tank. The lid opens to expose the recovery tank in it's entirety allowing it to be completely cleaned out. When the cover is open you are able to access the float assembly (17) and the Drain Saver (16).

Control Panel (3) - The control panel is located at the top rear of the machine and houses the switches and circuit breakers used to operate the machine.

Circuit Breakers (4) - The circuit breakers are used to protect the machine from both short circuits as well as circuit overloads.

Solution Drain Hose / Sight Gauge (5) - This hose serves as the drain for the solution tank as well as the sight gauge to show the level inside the tank.

Squeegee Tool (6) - The complete squeegee assembly that picks up the water from the floor.

Front Wheels (7) - The front wheels are a non slip rubber compound to keep the scrubber under control.

Rear Casters (8) - The rear casters are a chemical resistant poly material that rolls well and resists wear.

Solution Filter (9) - The solution filter is located underneath the bottom of the scrubber directly above the squeegee linkage and filters the solution before is flows through the machine.

Squeegee Lift Lever (10) - The squeegee lift lever is located at the rear of the machine near the floor and has a high visibility yellow cover on it. It was designed to be easily operated with a foot.

Battery Charger Port (11) - The plug where you plug in the battery charger

Recovery Tank (12) - The recovery tank holds the dirty water that is removed from the floor by the squeegee. The capacity of it is 33 gallons. The tank additionally holds the float assembly, that closes the path to the vacuum motor when the recovery tank is full, and the Drain Saver that catches large debris that are collected through the squeegee tool.

Recovery Drain Hose (13) - This hose is used to empty the dirty water from the recovery tank. The hose opening can be restricted with your hand to regulate the rate of discharge.

Body Lock Down Screw (14) - The body lock down screws are recessed into the sides of the scrubber. You use the supplied Body Allen Wrench to remove these and open the scrubber to gain access to it's inside components.

Body Allen Wrench (15) - This wrench is supplied to remove the body lock down bolts.

Drain Saver Screen (16) - The drain saver screen is designed to catch large debris that the squeegee picks up so your recovery tank stays cleaner and the drain hose does not clog.

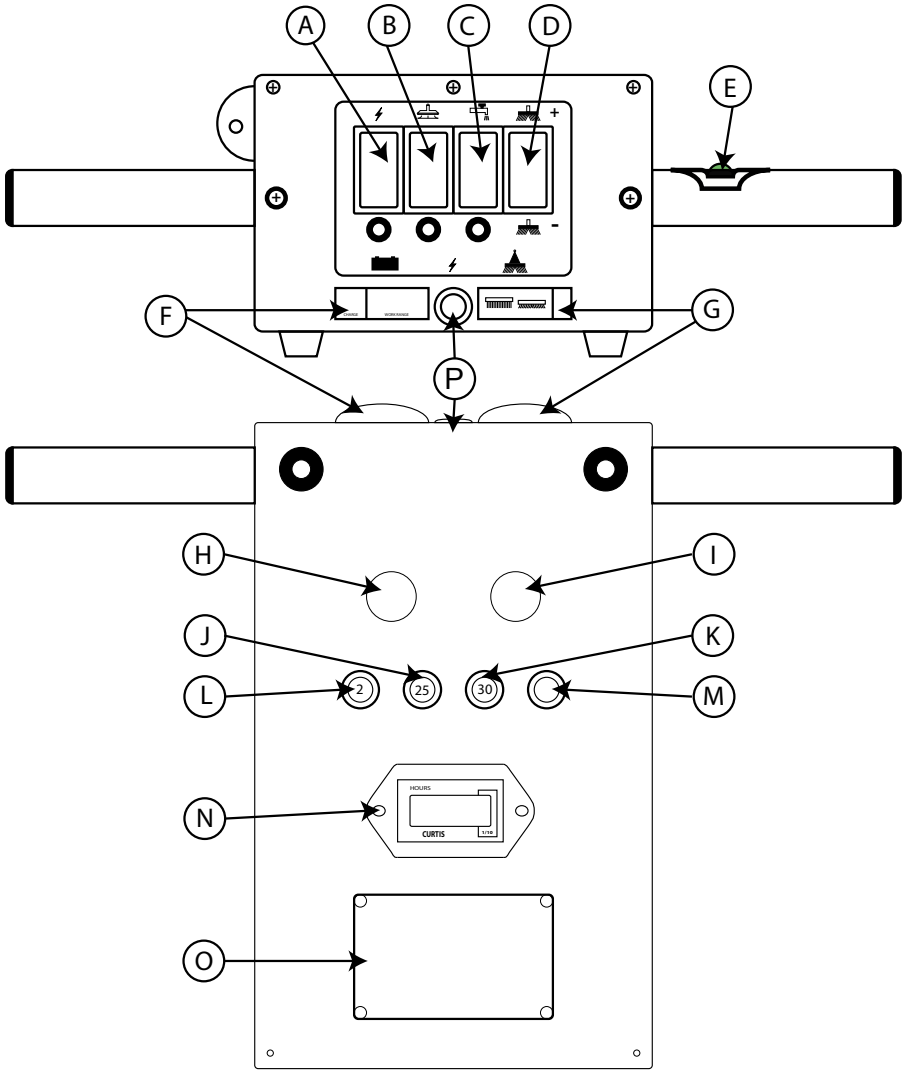
Vacuum Float & Screen (17) - The vacuum float and screen are designed to stop the flow of air to the vacuum in the event that the recovery tank fills completely so that the vacuum motor does pass water and to keep foreign objects from entering the vacuum motor.

Solution Valve (18) - The solution valve starts and stops the flow of water to the brush assembly.

Solution Fill Door (19) - The solution fill door is where you ad clean scrubbing water and soap to the solution tank. The solution tank holds the water and/or chemicals used to clean the floor. Use only approved detergents. Capacity is 35 gallons.

Brush Drive Adjuster (20) - The brush drive adjuster increases or decreases the amount of drive assistance the machine outputs.

CONTROL PANEL



A. Main Power Switch
B. Vacuum Switch
C. Solution Switch
D. Brush Motor Switch
E. Handle Switch
F. Battery Gauge
G. Brush Pressure Gauge
H. Emergency Stop (Optional)
I . Key Switch (Optional)
J. Vacuum Motor Circuit Breaker
K. Brush Motor Circuit Breaker
L. Brush Actuator Circuit Breaker
M. Water Jet Switch (Optional)
N. Hour Meter
O. Serial Number Plate
P. Power Indicator

CONTROL SWITCHES

Main Power Switch (A)- Turn power on and off to the entire machine
Vacuum Switch (B) - Turns the vacuum motor on and off
Solution Switch (C) - When in the on position the solution flows when the brushes run.
Brush Motor Switch (D) - When in the on position the brushes will run when the handle bar button is depressed.
Handle Bar Button (E) - Activates the brush motor and water if selected when it is depressed.
A**ctuator Circuit Breaker (L)** - The circuit breaker that protects the brush motor actuator.
Vacuum Motor Circuit Breaker (J) - The circuit breaker that protects the vacuum motor from overload.
Brush Motor Circuit breaker (K) - The circuit breaker that protects the brush motor from overload.

INDICATORS & METERS

Power Light (P) - Indicates the machine's main power switch is on.
Battery Gauge (F) - Shows the charge status of the battery
Brush Pressure Gauge (G) - Indicates the current consumption of the brush motor.
Hour Meter (N) - Shows the number of hours the machine has been operated.

BATTERY GAUGE

The battery gauge provides you with an estimation of the machine's battery condition. It has two "zones", red and green. When the battery is fully charged the needle of the gauge will read far into the green. As the charge of the batteries is exhausted the needle on the gauge moves closer to the red. When the needle on the gauge moves into the red section it is time to recharge the machine. When this occurs use the machine to pick up any standing water on the floor and place the machine on a charger for it's full cycle.

BRUSH PRESSURE GAUGE

The Brush pressure gauge indicates the relative amount of brush pressure being applied to the floor. The gauge has two "zones", red and green. The machine must always be run with the needle in the green zone or the scrub motor will be damaged. The more pressure that is applied to the floor the closer to the red zone the needle will travel. Increasing your brush pressure can dramatically shorten the overall run time of the machine because of increased power consumption.

SQUEEGEE SYSTEM

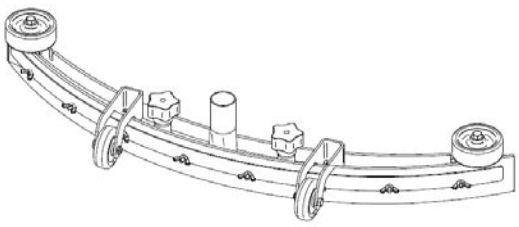
A scrubber's squeegee system is designed to work with the recovery system to pick up water and dirt from the floor using air flow created by the recovery system. The front blade of the squeegee tool is designed with notches in it that allow the air, water and dirt to pass through it while metering the air, increasing it's speed through the tool and recovery system.

The optimal performance of a squeegee is very dependent on proper adjustment and maintenance. The machines recovery system also has to be operating properly for the squeegee to perform well.

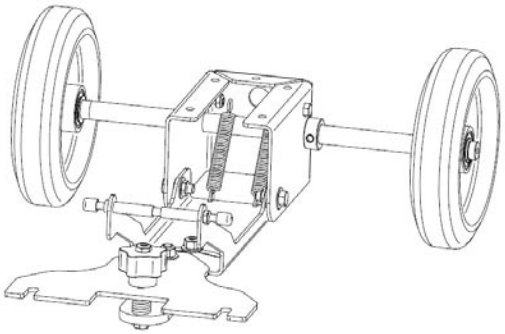
A vacuum gauge is a handy tool for checking this. You should be able to achieve 65" of water lift on most models. Put the vacuum gauge in the end of the squeegee hose to check. If you have questions on this tool setup call the factory at 800-634-4060.

SQUEEGEE SYSTEM COMPONENTS

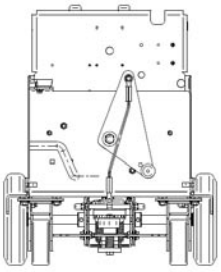
The squeegee tool with replaceable rollers, wheels & blades.



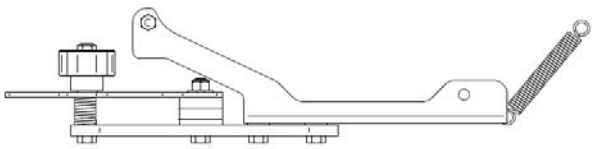
A suspension that mounts the squeegee to the machine, and allows the squeegee to move up and down with variations in the floor, and pivot in turns.



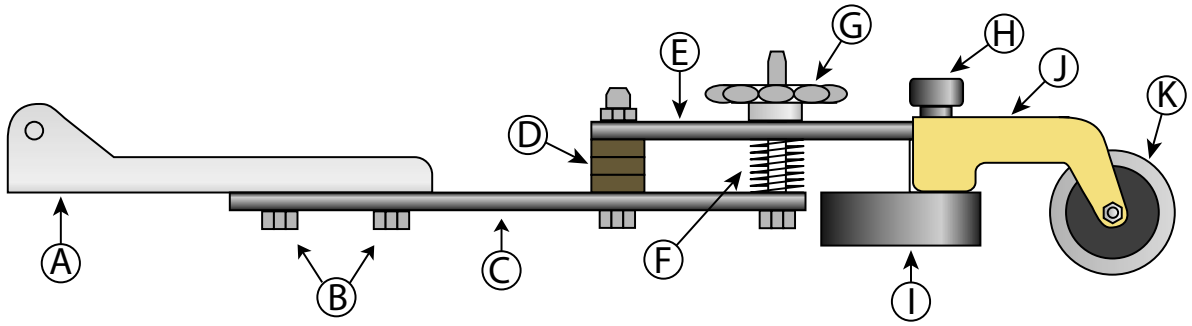
A lift system that allows the operator to raise the squeegee off the floor.



A pitch adjustment that allows the operator to adjust the squeegee for different floor surfaces. This is used for creating more of a leak under the front blade for smooth floors or less of one for rough floors.



SQUEEGEE SUSPENSION BREAKDOWN



A. SQUEEGEE SWING PLATE – The swing plate is vulnerable to bending if the machine is driven over a curb or large bump. Always check this for straightness. If it is bent at all it must be replaced. Make sure the plate moves up and down easily at it's pivot points.

B. PIVOT BOLTS - The squeegee pivots left and right at these bolts. If they are over tightened or not lubricated the squeegee will not track properly.

C. SQUEEGEE TRAIL ARM – This arm is made of ½" plate steel but is still possible to bend. If it is bent at all it must be replaced.

D. GROMMETS –These grommets maintain the proper spacing between the triangle plate and the trail Arm.

E. SQUEEGEE TRIANGLE PLATE – The squeegee is mounted to the triangle plate and ties it to the trail arm.

F. SPRING – Supplies pressure between the Triangle plate and the trail arm. Helps hold the adjustment. The squeegee will not operate without this spring.

G. PITCH ADJUSTMENT KNOB – The knob used to pitch the squeegee frontward or backwards. The squeegee should be adjusted to be flat to the floor.

H. SQUEEGEE HOLD DOWN KNOB – These knobs anchor the squeegee to the triangle plate. DO NOT OVER TIGHTEN!

I. SQUEEGEE TOOL BODY (SHOWN HERE WITHOUT BLADES) – The squeegee tool body is laser cut from ½" steel and must be perfectly straight and flat.

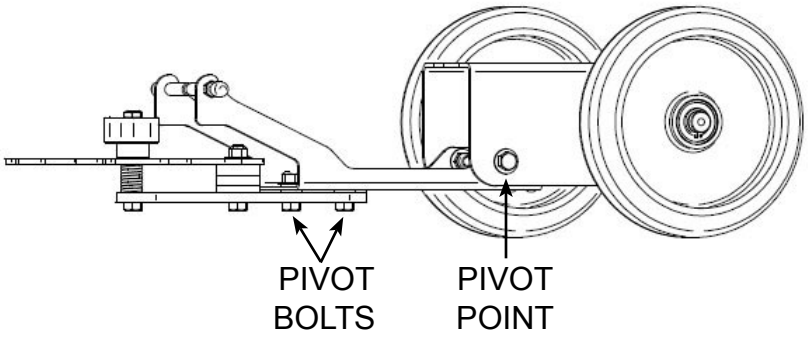
J. SQUEEGEE WHEEL TRAIL MOUNTS – The squeegee trail mounts attach the wheels to the squeegee. They can be adjusted by shimming them with flat washers.

K. SQUEEGEE WHEELS – The squeegee wheels should both touch the floor during operation and roll freely. They should both be adjusted to the same height. These wheels are wear items and should be replaced when squeegee blades are replaced.

TRIANGLE PLATE & TOW BAR

These parts cannot be bent at all. They must be completely straight and flat. If either is bent replace it.

If you replace triangle plate, adjust the clearance between the bottom of the plate and the top of the tow bar underneath so clearance is 7/8" (22 mm). Squeegee will not work if this adjustment is off!



UP/DOWN MOVEMENT

The squeegee must be able to travel up and down freely so it can glide over bumps and uneven surfaces. It is hinged at the front as shown.

If the squeegee suspension does not move up and down properly check the bolts and the Oilite bushings at the pivot point. If the bolts are too tight (they may have been tightened by customer by mistake) or the bushings are dried out or worn the squeegee will not be able to float properly.

SIDEWAYS MOVEMENT

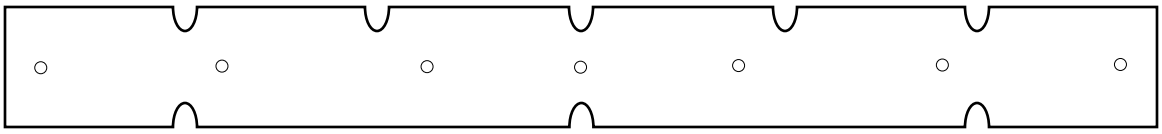
The squeegee must be allowed to move from side to side so that if it hits an obstacle it can move out of the way. If squeegee does not move freely from side to side check the bolt tension on the two pivot bolts. Check that the white plastic washers are not damaged.

In order for the squeegee system to operate properly the parts have to be assembled properly. **The space between the bottom of the "Squeegee triangle plate" – E, and the "squeegee trail arm" – B, must be exactly 7/8" on all models but the 390, the 390 measurement is 1 3/8".** If this dimension is incorrect you will never get the squeegee blade adjusted properly. If you believe you are having problems with this adjustment, please call the factory @ 800-634-4060.

SQUEEGEE BLADES

Squeegee blades are wear items. The back blade wears fastest on the edge that contacts the floor (lower front edge). This blade can ideally be turned four times. It is important to have a sharp squeegee edge on the floor; otherwise the squeegee does not scrape the water off the floor but instead glides right over it.

The front blade wears very well when properly adjusted, but it can get torn. It can be installed one of two ways: “3 notches down” for normal floors, and “5 notches down” for extremely smooth floors.



REPLACING BLADES

We stock individual blades or blade kits that include a blade set and new set of squeegee trailing wheels. We recommend changing the trailing wheels when you change blades as they are wear items and they are critical to the proper operation of the squeegee.

When installing blades they must be installed without bumps or ripples. The squeegee should have a smooth edge that rides on the floor. When adjusting the blades you need to achieve a uniform “fanning” of the blade from one tip to the other. If the blade does not do this it is installed incorrectly or misadjusted. (See page 3-6)

When changing or turning squeegee blades it is very important to note the orientation of the stainless steel retaining band for re-installation. The holes are offset to make a wide side and narrow side. The wide side always goes UP. If the band is installed incorrectly the squeegee will not function properly

TOP

BOTTOM

ORDERING BLADES

1. Find the squeegee size:
   Check the stamped number on the top of the squeegee body and order the corresponding blade size: (32, 35 ,38 or 45 inches).
2. Choose the appropriate material:
   Gum rubber - These blades are tan in color and best for most applications including irregular floors. They wear out quickly on rough floors however and do not tolerate oil, other petroleum products or heavy citrus cleaners. The kit number suffix for gum rubber is “G”. (Example 28-770-G)
   Linatex - These blades are red in color and designed to be very durable while at the same time giving optimum performance. They are very abrasion resistant and perform acceptably on irregular floors. They tolerate oil, petroleum products and heavy citrus cleaners better than gum rubber. The kit number suffix for Linatex is “L”.
   Polyurethane - These blades are nearly clear and are recommended for oil, petroleum or heavy citrus cleaner applications where gum rubber or Linatex would fail. It rarely works as efficiently as gum rubber or Linatex but is somewhat abrasion resistant. The kit number suffix for polyurethane is “U”.

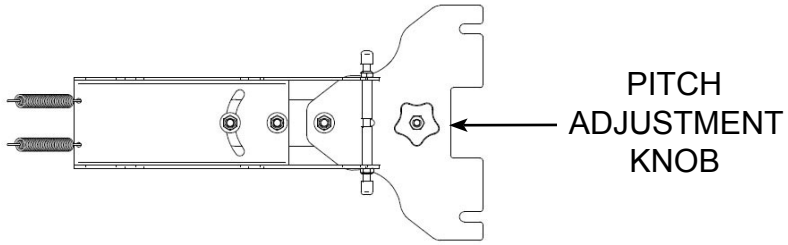
SQUEEGEE ADJUSTMENT

A squeegee needs to be adjusted to the type of surface that it is operating on. This means the adjustments that pick up well on rough concrete will probably not work well on glass-smooth vinyl tile or ceramic tile. The reverse would hold true also, a squeegee set up for a smooth surface will not work well on rough surfaces. As a squeegee wears, the dynamics or condition of the blades change, sometimes requiring small adjustments or sometimes requiring a blade turning or change.

Our squeegee system has only one operator-serviceable adjustment. That adjustment is the pitch adjustment knob directly in front of the squeegee blade. By turning this knob you pivot the squeegee back and forth increasing or decreasing the amount of air allowed into the squeegee under the bottom of the front blade. The basic adjustment you are trying to achieve is to have the squeegee PERFECTLY parallel with the floor. From that point, pitching the squeegee forward about one half degree of pitch will reduce air leak. Pitching the squeegee backwards about one half degree will increase the air leak.

PITCH ADJUSTMENT KNOB

The triangular shaped plate that the squeegee bolts to is adjustable for a slight amount of up/down pitch. As you turn the knob the pitch of the squeegee changes.



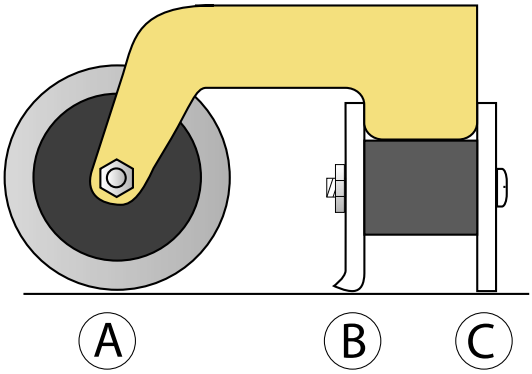
Turning the knob clockwise lowers the front blade of the squeegee thereby closing off the air holes against the floor. This increases suction on the floor. If you adjust it too far forward you can cause chattering problems or excessive front squeegee blade wear.

If too much suction is created the squeegee will “chatter”, and may come off the machine. If this happens the suction must be reduced by turning the knob counterclockwise 1 to 2 turns to create more of an air leak at the front blade.

You can over adjust in either direction. The squeegee will not work if the back blade is not evenly deflected across rear, and if wheels do not touch the floor.

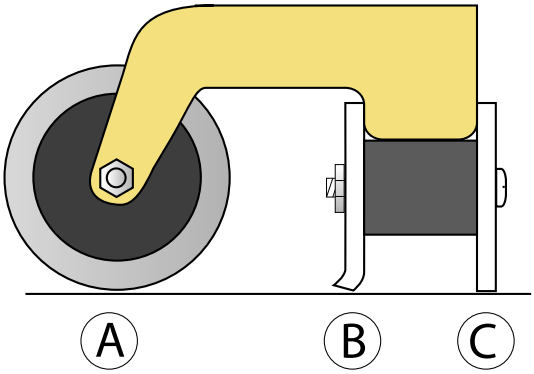
SQUEEGEE ADJUSTMENT EXAMPLES

FIGURE 1



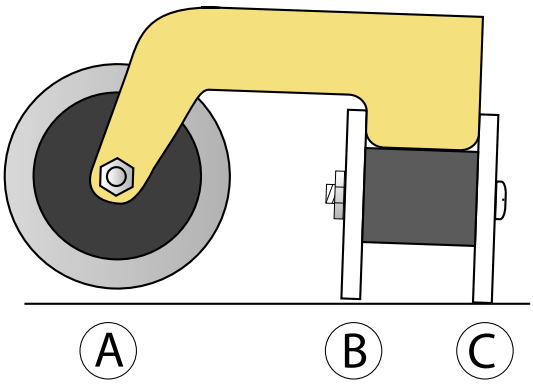
Worn Blade: Squeegee wiping edge "B" has worn so the square edge is gone. The squeegee now runs over the water instead of scraping it off the floor.

FIGURE 2



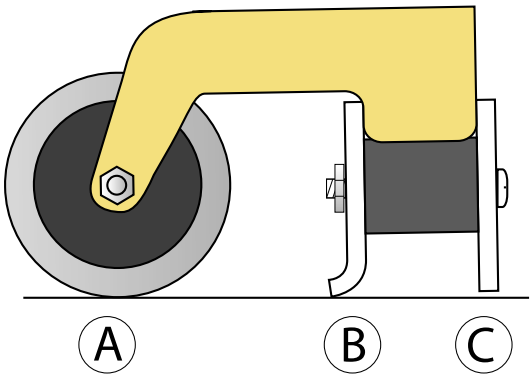
Properly Adjusted Squeegee: Front blade "C" just contacts the floor rear blade "B" is slightly flared outward

FIGURE 3



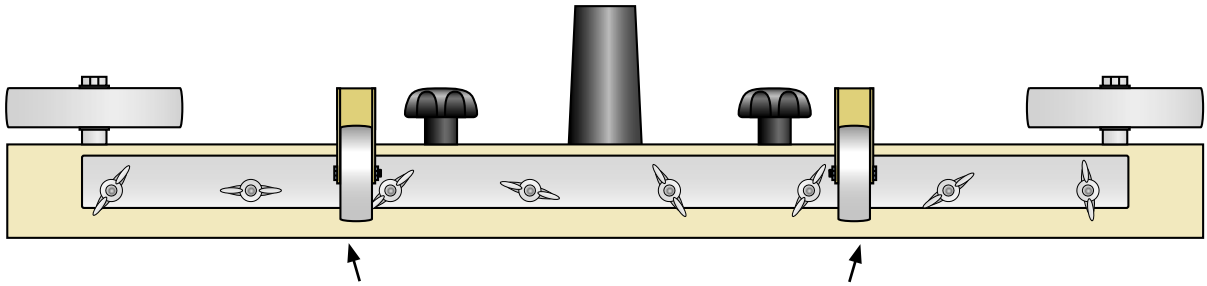
Too much forward pitch on this squeegee. The Rear blade "B" is barely making contact with the floor. The rear wheels "A" are not touching the floor.

FIGURE 4



Too much backward pitch on this squeegee. The rear blade "B" is laying over and the front blade "C" is not touching the floor.

The squeegee has trailing wheels that MUST touch the floor and roll as the machine is traveling forward. They MUST both be adjusted to the same height. You can check their adjustment by removing the squeegee from the machine, making sure the squeegee has good blades on it and setting the squeegee on a flat surface.



The wheels will wear down under normal use and their diameter will change. To maintain the system properly, the customer receives new trailing wheels with the squeegee blade kit. The trailing wheels should be changed when the blades are changed or immediately if they become damaged.

Our squeegee trailing wheel system is theoretically “not adjustable” meaning that it is not intended for end-users to adjust it.

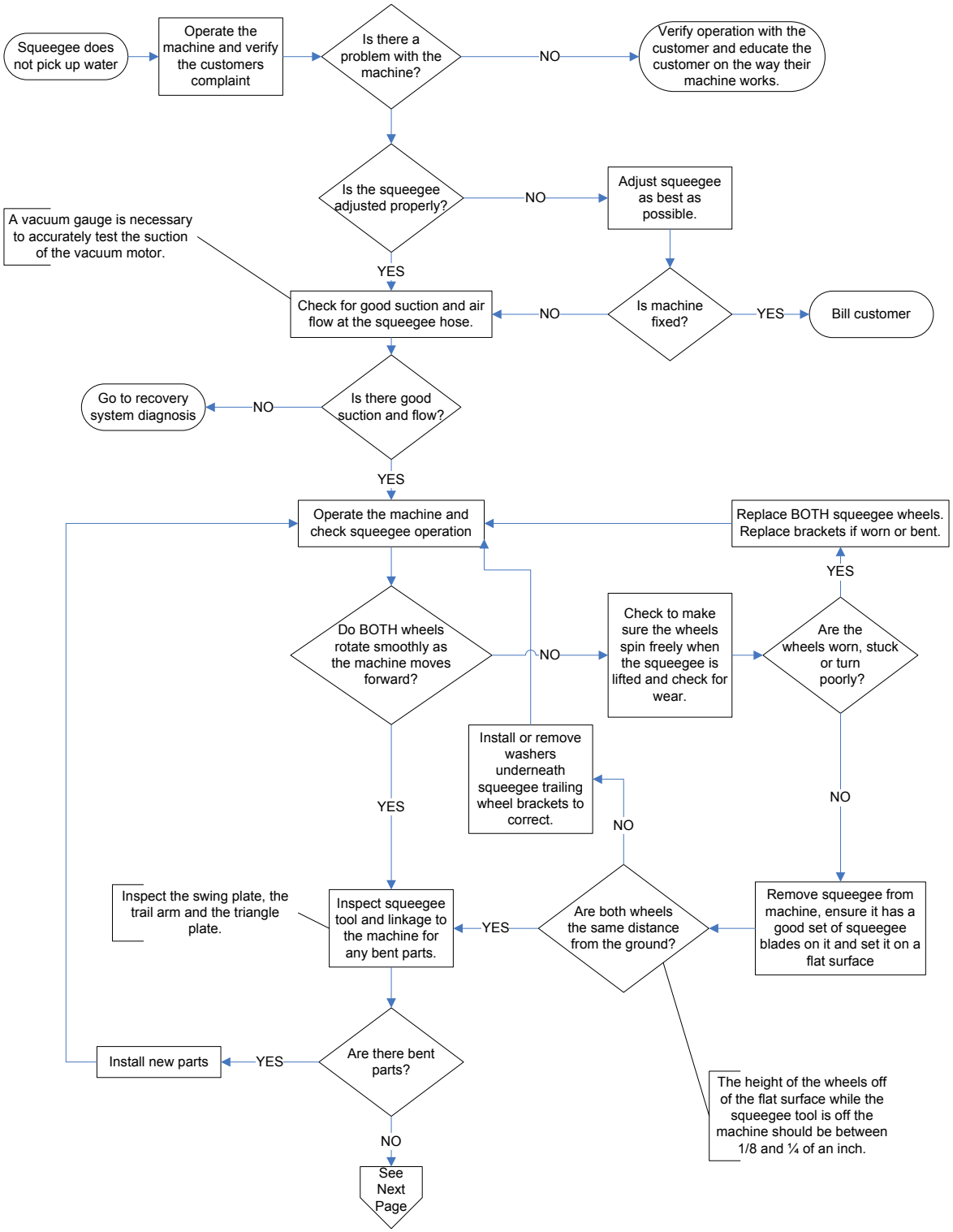
If you have good wheels of the correct diameter on the squeegee, and they contact the floor incorrectly, then observe the space between the wheels and a flat surface with the squeegee tool off of the machine. Adjust the rear wheel bracket heights as necessary to make them equal using washers or shims.

NOTE:
To make a wheel lower toward the floor, insert a washer under its FRONT bracket bolt.
To make the wheel raise from the floor, insert a washer under each FRONT and REAR bolt.

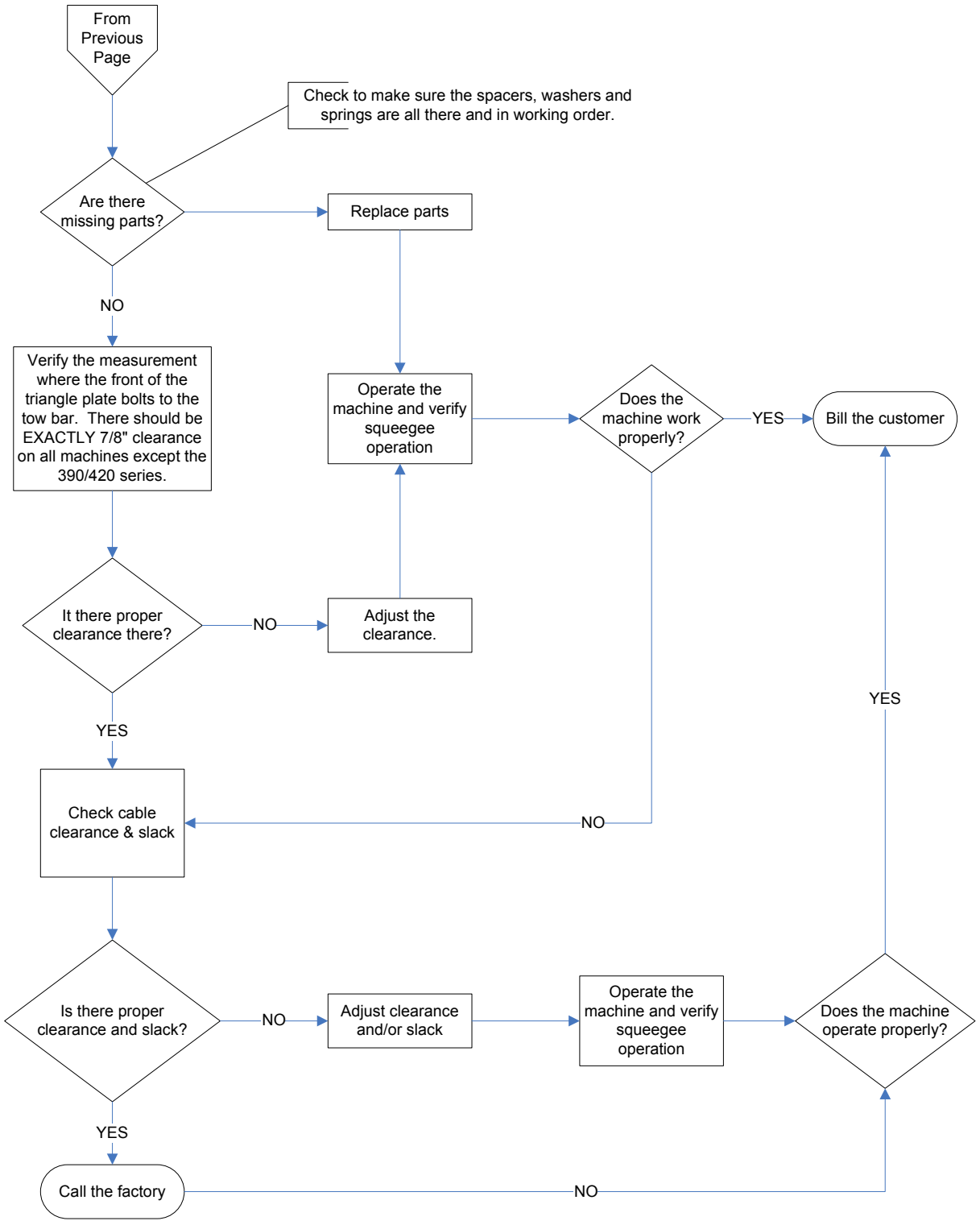
SQUEEGEE TROUBLESHOOTING

SQUEEGEE PROBLEM:	CAUSE / (SOLUTION)
Not picking up water	Is the squeegee or vac system clogged?
	Are the blades worn out?
	Is the machine straight from side to side? (No pitch or lean to either side because of tire problems?)
	Does machine have a slight pitch/lean backwards? (The unit should have about a 1-2 degree pitch/lean to the rear.)
	Is the squeegee or suspension bent or missing parts?
Leaving streaks	Dirt on blades. Wipe off with rags.
	Chip or tear in rear squeegee blade. (Turn blade or replace)
	Rear wheel of squeegee is making streak. (Replace wheels)
Sways back & forth	One or both wheels not touching floor. (Replace wheels and/or their brackets, shim as necessary.)
	Front or rear bolt missing or loose in triangle plate. Tighten or replace. Clearance between triangle and tow bar is 7/8".
Falls off frequently	Plastic knobs are loose. (Tighten)
	Operator hand strength is too low to tighten squeegee knobs adequately causing squeegee to fall off regularly. (Add a bevel washer <preferred> or a flat washer between each knob and the squeegee.
	Squeegee is creating too much suction on the floor. (This creates squeegee "chatter" Refer to squeegee adjustment section pg. 3-5)
	Triangle plate is bent where the squeegee attaches. (Replace)
Squeegee Leaves Water:	Squeegee is actually working properly but the operator has unreal expectations. (Educate the operator)
	Squeegee pitch out of adjustment (Adjust)
	Floor is extremely rough. (Use a solid front blade to control air better.)
	Back blade is worn out. (Rotate or replace blade)
	Squeegee tool is bent & leaking. (Replace tool)
	Squeegee suspension is bent. (Replace bent components)
	Operator sees water left on very hard turns. (Educate the operator on making more gradual turns or to shut off the water before entering a turn.)
Squeegee howls or trumpets	Squeegee is creating too much a suction on the floor. (Adjust squeegee to allow more air to enter from the front blade. Counter-clockwise adjustment.)
	Squeegee is creating too much a suction on the floor. (Reverse front blade so five notches face downward to allow more air flow)
Squeegee needs too much adjustment	Customer has a varied floor surface. Some of the floor is smooth other parts are very rough. (Frequent adjustment is normal and will be required.)
	Adjustment knob spring is missing , incorrect or damaged. (Replace)
Blades wear out very quickly	Floor is very rough. Switch to Linatex rubber (red blades) which is very resistant to abrasion.

SQUEEGEE SYSTEM DIAGNOSIS FLOW CHART 1 of 2


Squeegee does not pick up water
Operate the machine and verify the customers complaint
Is there a problem with the machine?
NO
Verify operation with the customer and educate the customer on the way their machine works.
Is the squeegee adjusted properly?
NO
Adjust squeegee as best as possible.
A vacuum gauge is necessary to accurately test the suction of the vacuum motor.
YES
Check for good suction and air flow at the squeegee hose.
NO
Is machine fixed?
YES
Bill customer
Go to recovery system diagnosis
NO
Is there good suction and flow?
YES
Operate the machine and check squeegee operation
Replace BOTH squeegee wheels. Replace brackets if worn or bent.
YES
Do BOTH wheels rotate smoothly as the machine moves forward?
NO
Check to make sure the wheels spin freely when the squeegee is lifted and check for wear.
Are the wheels worn, stuck or turn poorly?
Install or remove washers underneath squeegee trailing wheel brackets to correct.
NO
YES
NO
Inspect the swing plate, the trail arm and the triangle plate.
Inspect squeegee tool and linkage to the machine for any bent parts.
YES
Are both wheels the same distance from the ground?
Remove squeegee from machine, ensure it has a good set of squeegee blades on it and set it on a flat surface
Install new parts
YES
Are there bent parts?
The height of the wheels off of the flat surface while the squeegee tool is off the machine should be between 1/8 and ¼ of an inch.
NO
See Next Page

SQUEEGEE SYSTEM DIAGNOSIS FLOW CHART 1 of 2


From Previous Page
Check to make sure the spacers, washers and springs are all there and in working order.
Are there missing parts?
Replace parts
NO
Verify the measurement where the front of the triangle plate bolts to the tow bar. There should be EXACTLY 7/8" clearance on all machines except the 390/420 series.
Operate the machine and verify squeegee operation
Does the machine work properly?
YES
Bill the customer
It there proper clearance there?
NO
Adjust the clearance.
YES
YES
Check cable clearance & slack
NO
Is there proper clearance and slack?
NO
Adjust clearance and/or slack
Operate the machine and verify squeegee operation
Does the machine operate properly?
YES
Call the factory
NO

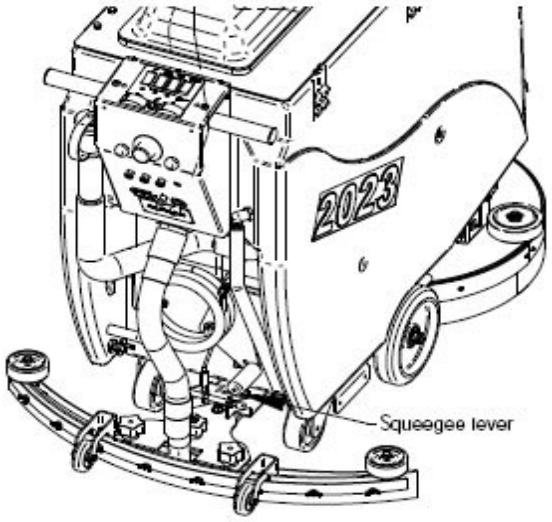
SQUEEGEE LIFT SYSTEM

The squeegee lift system on the 2023 system was designed with simplicity in mind. It has very straight forward operation and minimal parts to assure consistent and highly reliable operation.

TO OPERATE

To lower the squeegee place your foot under the yellow lever located at the right rear of the machine below the control panel.

To lift the squeegee press down on the yellow colored lever with your foot.



SQUEEGEE LIFT ADJUSTMENTS

There are no provisions for adjustment of the squeegee lift. If the squeegee is not raising and lowering properly it is due to bent or worn part or parts. Inspect the lift assembly and other related systems for bent or worn parts and replace as necessary.

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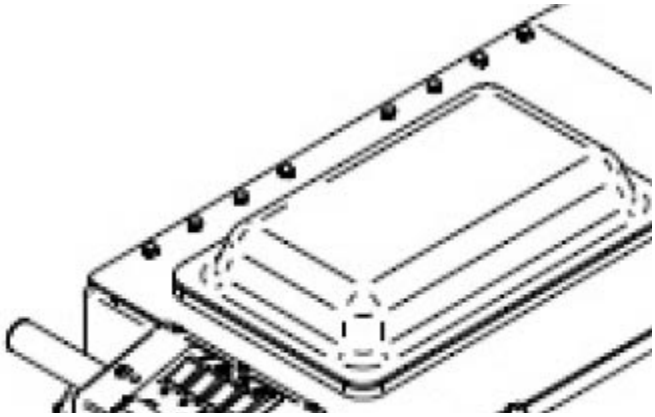
RECOVERY SYSTEM

The recovery system of the 2023 series is powered by a 24 volt 550 watt vacuum motor. The recovery tank is designed with a large lid to facilitate the ability to completely clean out the recovery tank when use of the machine is finished. The vacuum motor draws air in through the squeegee tool, through the squeegee hose and into recovery tank. The water travels with the air flowing through the system and falls out of the air when it reaches the recovery tank. The air then passes through the vacuum saver and out through the vacuum motor. The recovery tank is equipped with a clear lid that allows the operator to observe the conditions inside the recovery tank as well as the recovery water level inside. Inside the recovery tank there are 4 major components. The recovery lid, drain saver, vacuum float and the water baffle.

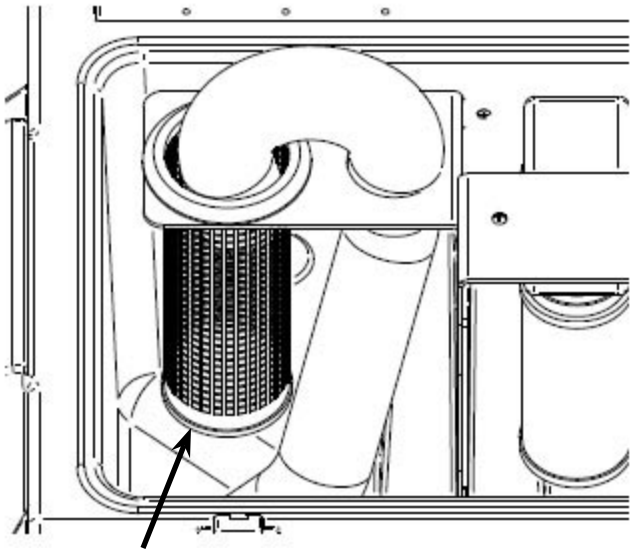
RECOVERY LID

The recovery is made from 1/8” thick stainless steel with a clear dome. The dome is to provide you with the ability to see the condition of the recovery tank during operation.



DRAIN SAVER

The drain saver is located inside the recovery tank and is accessed by opening the recovery lid. It is designed to collect large debris that is picked up by the squeegee so it does not settle in your recovery tank or clog the drain hose.

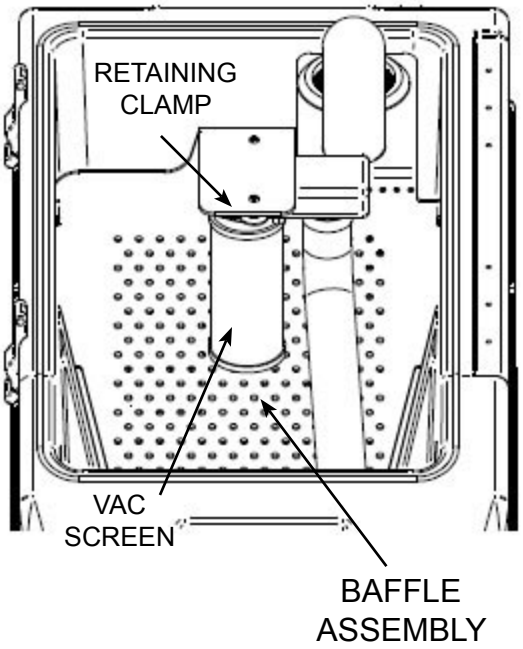


DRAIN
SAVER

VACUUM FLOAT

The vacuum float assembly is located inside the recovery tank and is accessed by opening the recovery tank lid. The float stops the flow of air in the event that the recovery tank is filled to capacity.

To clean:
Remove the white retaining clamp from the screen.
Pull the vac screen / float ball assembly off the vac box.
Rinse with hot water. Scrub with a brush if necessary
Dry thoroughly.
Replace vac screen / float ball assembly onto vac box.
Replace and tighten clamp.

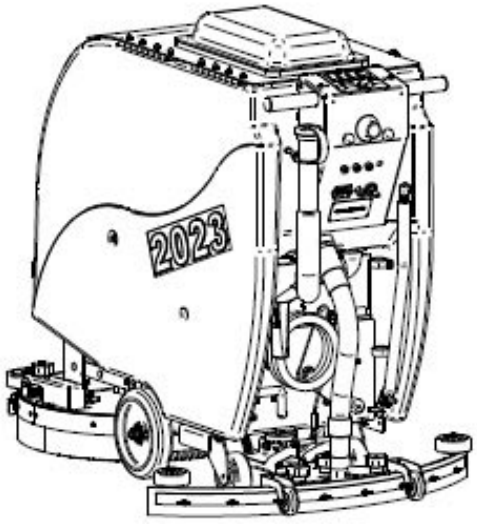


BAFFLE ASSEMBLY

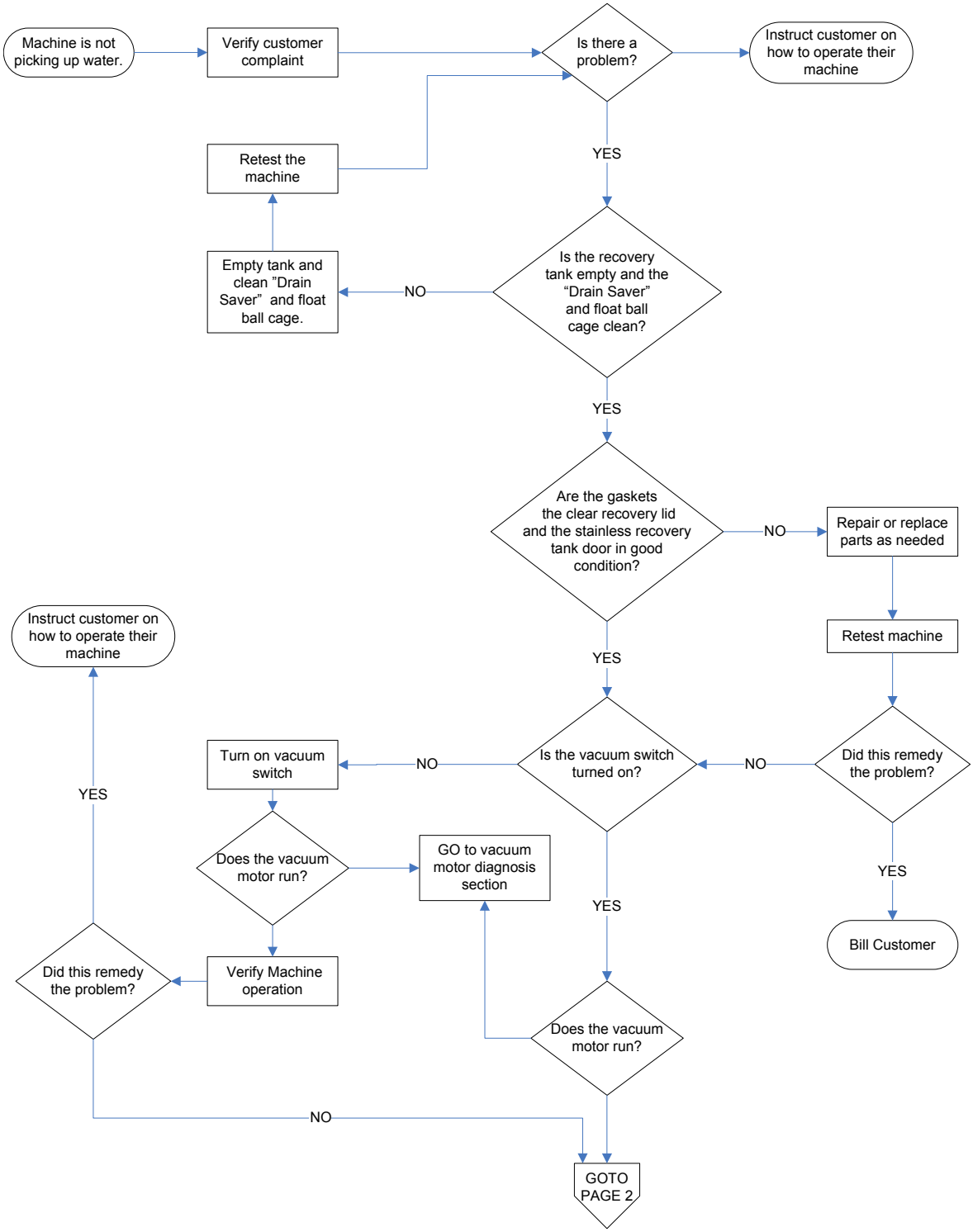
The baffle assembly is also located inside the recovery tank and accessed by opening the recovery tank lid. The baffle adds rigidity to the tank walls and lessens the sloshing of the water inside the recovery tank.

DRAIN HOSE

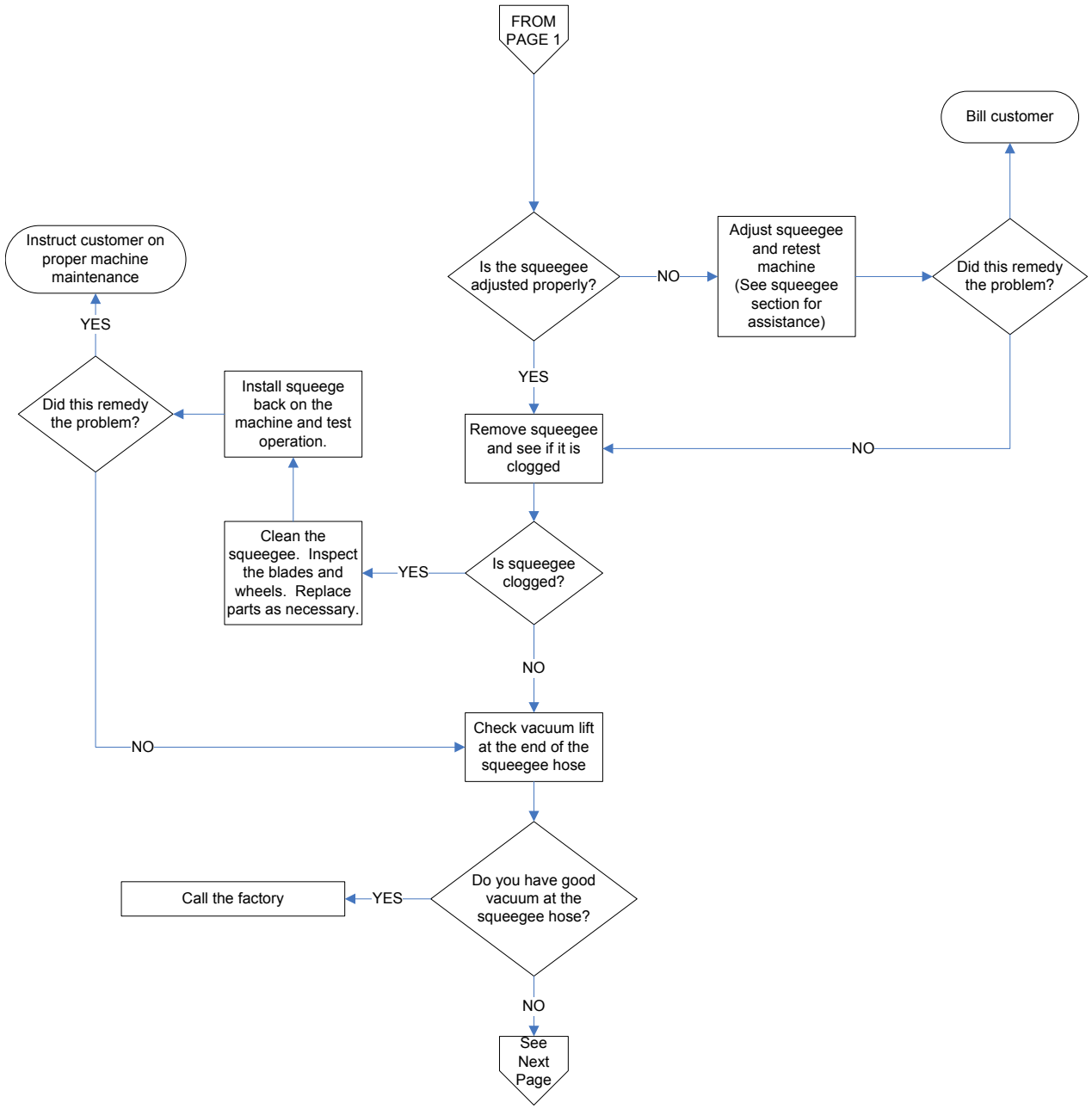
To drain the recovery system the machine is equipped with a poly hose with an integrated flow control feature. By squeezing the hose the flow of the waste water from the recovery tank can be metered as it is being emptied. The hose cap is attached to the hose with a tether to help prevent loosing it.



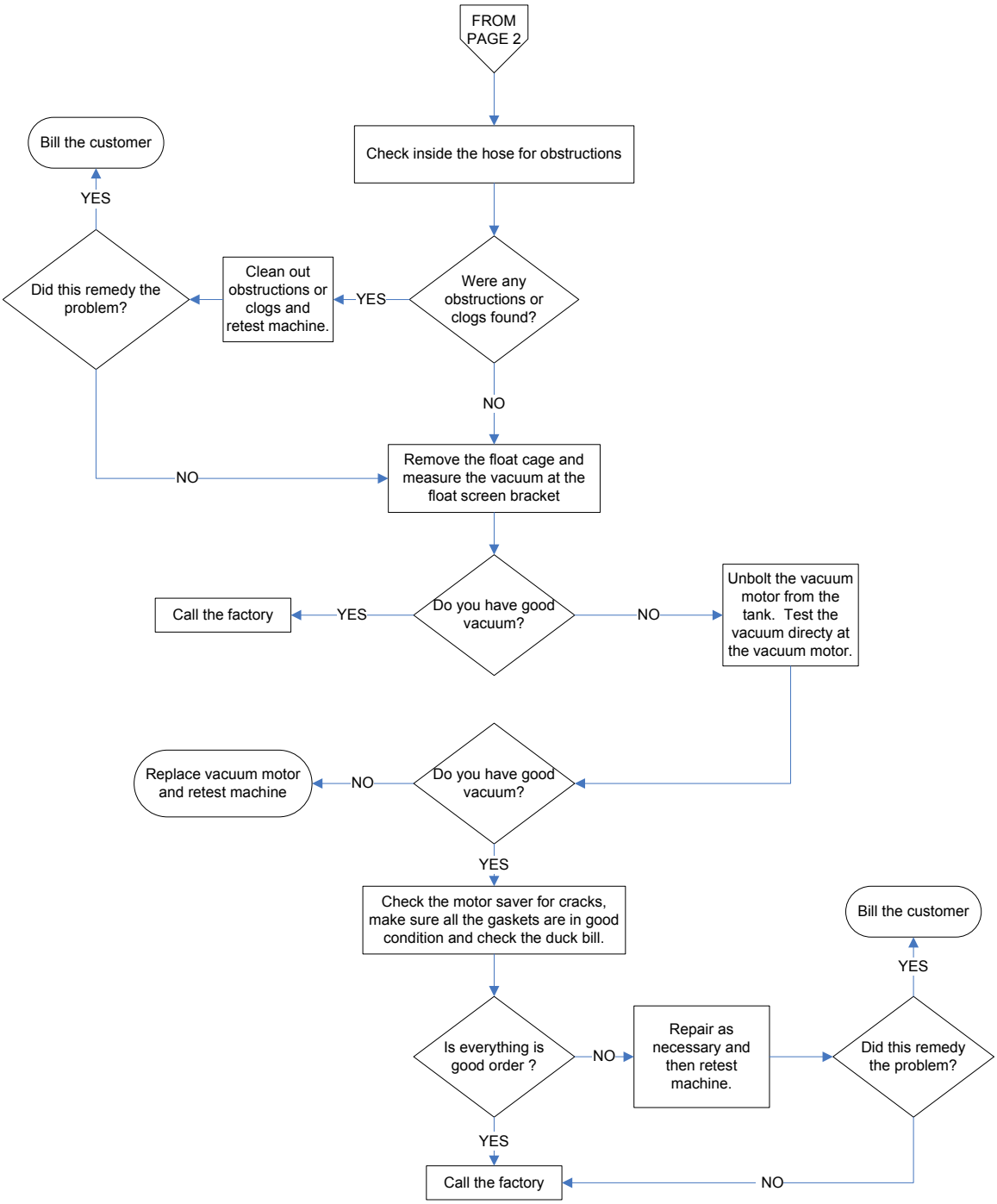
MODEL 2023 RECOVERY SYSTEM DIAGNOSTIC FLOW CHART
1 of 3


Machine is not picking up water.
Verify customer complaint
Is there a problem?
Instruct customer on how to operate their machine
YES
Retest the machine
Empty tank and clean "Drain Saver" and float ball cage.
NO
Is the recovery tank empty and the "Drain Saver" and float ball cage clean?
YES
Are the gaskets the clear recovery lid and the stainless recovery tank door in good condition?
NO
Repair or replace parts as needed
Retest machine
YES
Instruct customer on how to operate their machine
Turn on vacuum switch
NO
Is the vacuum switch turned on?
NO
Did this remedy the problem?
YES
Bill Customer
YES
Does the vacuum motor run?
GO to vacuum motor diagnosis section
YES
Did this remedy the problem?
Verify Machine operation
Does the vacuum motor run?
NO
GOTO PAGE 2

MODEL 2023 RECOVERY SYSTEM DIAGNOSTIC FLOW CHART
2 of 3


FROM PAGE 1
Is the squeegee adjusted properly?
NO
Adjust squeegee and retest machine (See squeegee section for assistance)
Did this remedy the problem?
Bill customer
YES
Remove squeegee and see if it is clogged
NO
Is squeegee clogged?
YES
Clean the squeegee. Inspect the blades and wheels. Replace parts as necessary.
NO
Check vacuum lift at the end of the squeegee hose
Do you have good vacuum at the squeegee hose?
YES
Call the factory
NO
See Next Page
Did this remedy the problem?
YES
Install squeege back on the machine and test operation.
Instruct customer on proper machine maintenance
NO

MODEL 2023 RECOVERY SYSTEM DIAGNOSTIC FLOW CHART
2 of 3


FROM PAGE 2
Check inside the hose for obstructions
Were any obstructions or clogs found?
YES
Clean out obstructions or clogs and retest machine.
Did this remedy the problem?
YES
Bill the customer
NO
Remove the float cage and measure the vacuum at the float screen bracket
NO
Do you have good vacuum?
YES
Call the factory
NO
Unbolt the vacuum motor from the tank. Test the vacuum directy at the vacuum motor.
Do you have good vacuum?
NO
Replace vacuum motor and retest machine
YES
Check the motor saver for cracks, make sure all the gaskets are in good condition and check the duck bill.
Is everything is good order ?
NO
Repair as necessary and then retest machine.
Did this remedy the problem?
YES
Bill the customer
YES
Call the factory
NO

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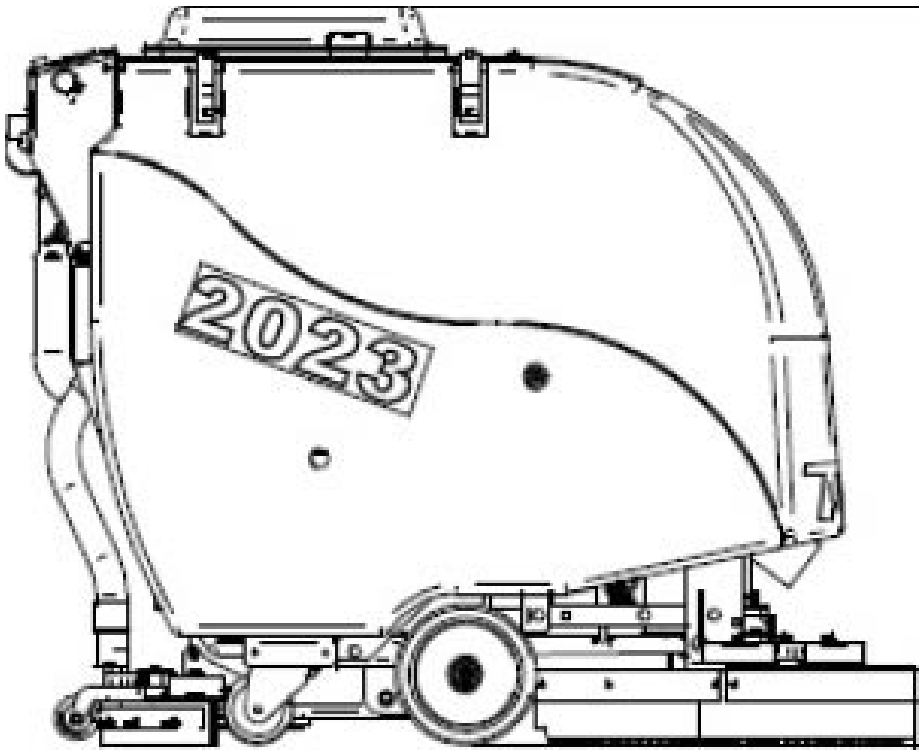
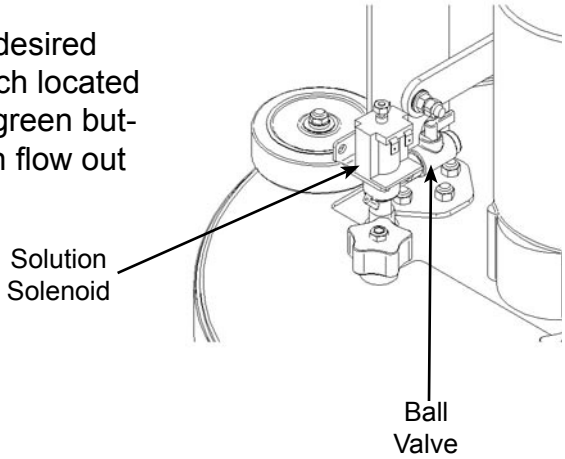
SOLUTION SYSTEM

The solution system on the 2023 series consists of main body of the machine which is also the solution tank, the fill opening, sight gauge/drain, filter, ball valve (not on early production machines), Solution solenoid valve and solution control panel switch. The solution is turned on with the toggle switch on the control panel of the machine and lets solution flow out of the machine only when the brush is running. The solution solenoid valve then allows solution to flow onto the top of the brush where it can run through the shower feed holes and onto the scrubbing surface. On early models the solution solenoid valve has a knob and is adjustable to control the amount of solution that is dispensed onto the floor. On later models the knob was removed from the solenoid and a ball valve was added to control the volume of solution dispensed.



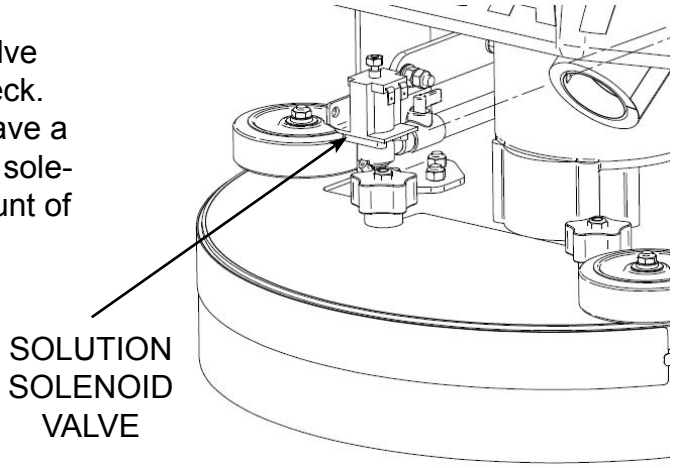
DISPENSING SOLUTION

Make sure the recovery tank is at least 1/2 full with desired scrubbing solution. Turn on the solution rocker switch located on the control panel. Activate the brushes with the green button on the right handle grip and the solution will then flow out of the solution solenoid valve.



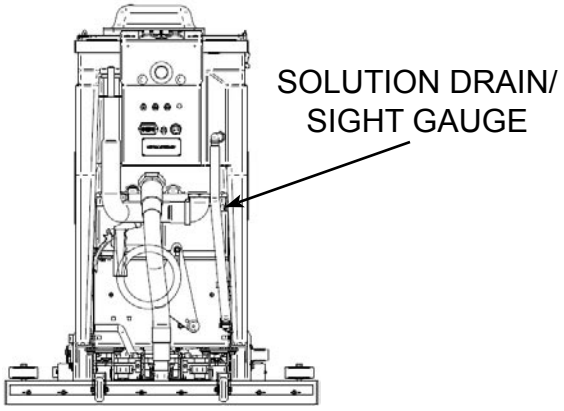
ADJUSTING SOLUTION FLOW

To adjust the solution flow use the ball valve mounted on the right side of the brush deck. (Note: Early production models did not have a ball valve. On these models the solution solenoid valve is adjusted to control the amount of solution flow.)



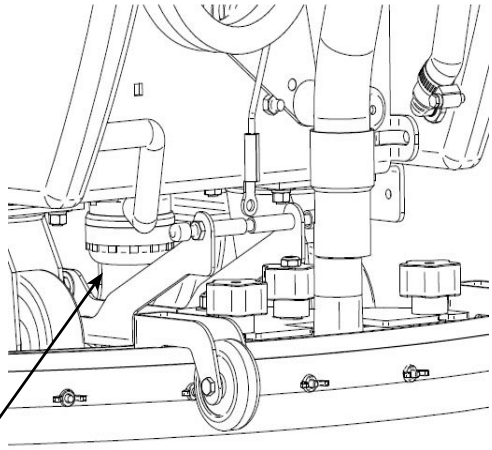
DRAINING SOLUTION TANK

Detach the solution drain / sight gauge hose from the upper barb and lower into a suitable drain or receptacle. When the solution has emptied reattach the hose to the upper barb.

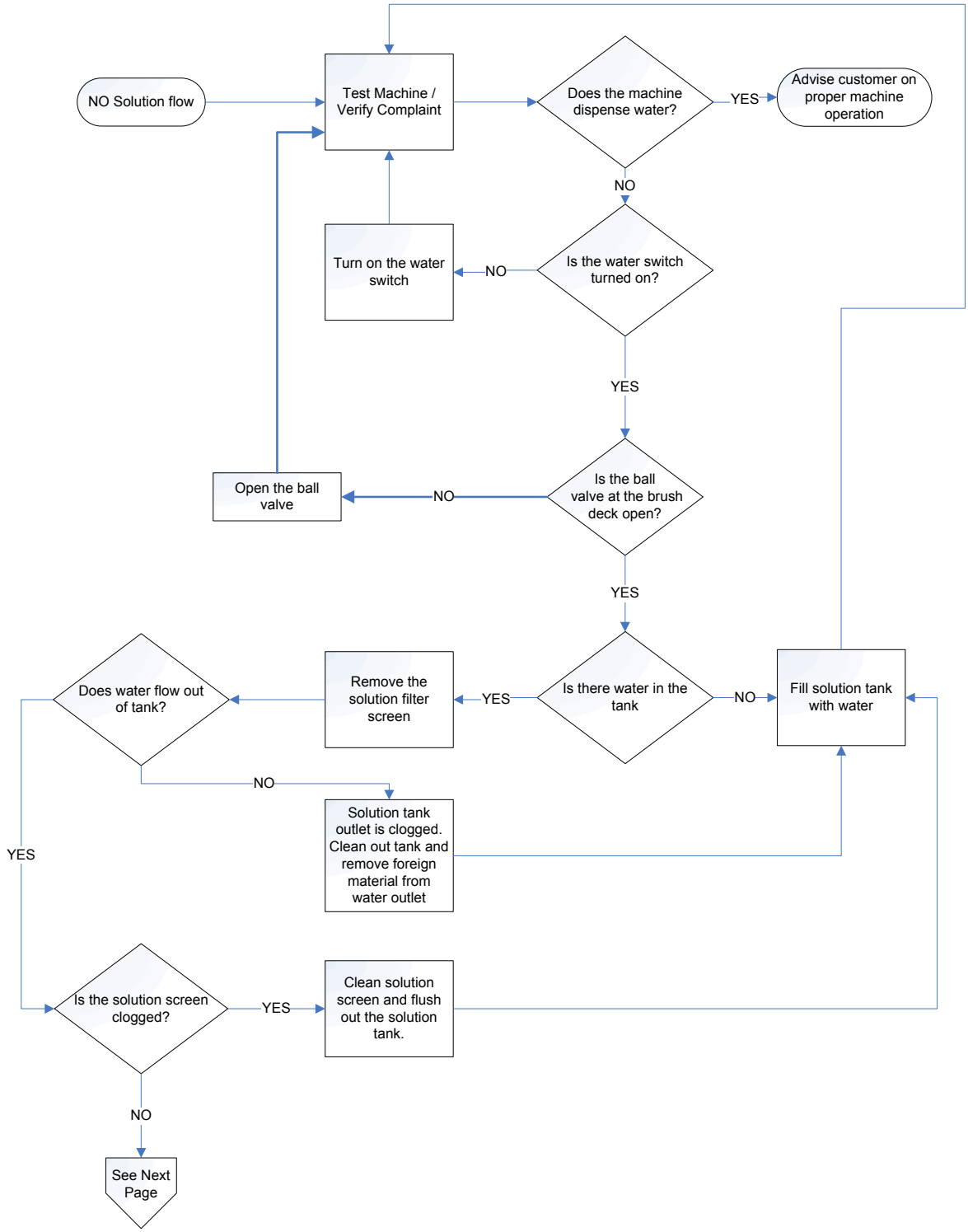


CLEANING SOLUTION FILTER

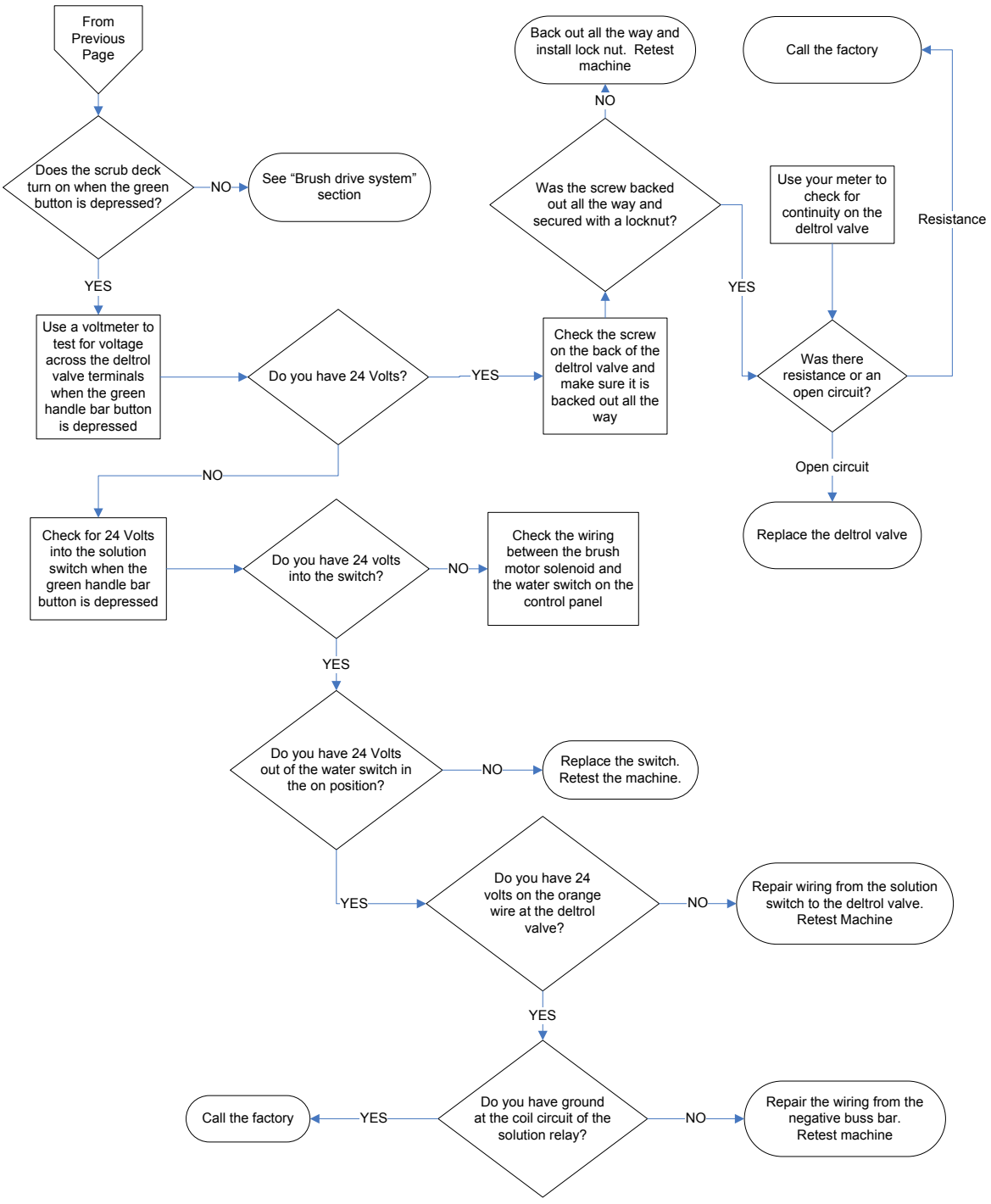
Drain solution tank with the drain hose. Remove squeegee tool from the machine. Lower the squeegee linkage. Reach under the machine and unscrew and remove the clear part of the plastic filter housing. Remove screen and clean. Replace screen and clear part of filter housing.



SOLUTION SYSTEM DIAGNOSIS FLOW CHART 1 of 2



SOLUTION SYSTEM DIAGNOSIS FLOW CHART 2 of 2

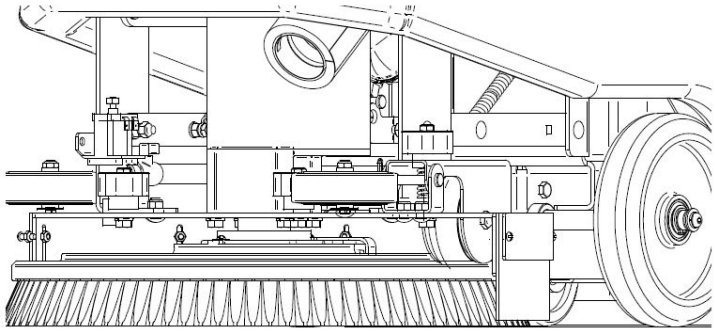

From Previous Page
Does the scrub deck turn on when the green button is depressed?
NO
See "Brush drive system" section
YES
Use a voltmeter to test for voltage across the deltrol valve terminals when the green handle bar button is depressed
Do you have 24 Volts?
YES
Check the screw on the back of the deltrol valve and make sure it is backed out all the way
Was the screw backed out all the way and secured with a locknut?
NO
Back out all the way and install lock nut. Retest machine
YES
Use your meter to check for continuity on the deltrol valve
Was there resistance or an open circuit?
Resistance
Call the factory
Open circuit
Replace the deltrol valve
NO
Check for 24 Volts into the solution switch when the green handle bar button is depressed
Do you have 24 volts into the switch?
NO
Check the wiring between the brush motor solenoid and the water switch on the control panel
YES
Do you have 24 Volts out of the water switch in the on position?
NO
Replace the switch. Retest the machine.
YES
Do you have 24 volts on the orange wire at the deltrol valve?
NO
Repair wiring from the solution switch to the deltrol valve. Retest Machine
YES
Do you have ground at the coil circuit of the solution relay?
YES
Call the factory
NO
Repair the wiring from the negative buss bar. Retest machine

BRUSH DRIVE SYSTEM

The brush drive system on the 2023 series is also a machine drive assist system. This means that the force created by the pad on the floor is also used to help propel the machine forward when scrubbing. The system consists of the brush drive motor, brush driver hub, scrub brush or pad holder, the idler wheel and the adjustment knob. The drive hub is a “gimbaled” design that helps compensate for irregularities of the floor. Only original factory equipment brushes should be used on this machine or premature scrub motor failure may occur. “Will-Fit” brushes are usually not concentric and promote bearing failure”

BRUSH ASSIST

The scrub brush or pad driver is used to propel the machine forward. There is a knob on the left side of the scrub deck that allows the operator to adjust the amount of propulsion. The knob applies pressure to a wheel that runs on the top of the scrub brush or pad holder applying pressure to one side of the brush or pad holder causing the brush or holder to pull the machine forward.



BRUSH DRIVE ELECTRICAL CIRCUIT

The negative side of the battery connects directly to the scrub brush motor. The positive side of the battery passes through a relay, from the relay to the 30 amp push button circuit breaker located on the rear of the control panel and then to the scrub brush motor. The relay is located on the right front side of the brush wall compartment.

When the operator pushes the green button in the handle bar, this switch sends positive battery power to the relay’s coil terminal. The negative side of the coil in connected to a battery negative. When the positive power is received by the relay coil it pulls the relay contacts closed and turns on the brush motor.

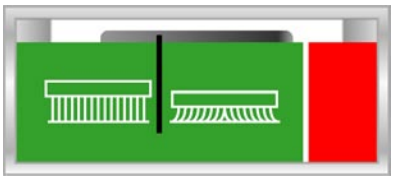
Therefore, when the master switch is on, pushing the green button will turn on the brush motor. This is true whether the brush is down on the floor or up in the air.

SETTING BRUSH PRESSURE

Lower the scrub deck to the floor. Turn on the solution switch and turn on the brush by using the green handle-bar button. Observe the brush pressure gauge on the control panel and make sure it does not enter the red zone while scrubbing. If the machine is operated in the red zone, the motor is being over-worked, and it will blow the brush circuit breaker. If this breaker blows, wait until it cools and reset it. Reduce brush pressure and resume scrubbing.

HEAVY-DUTY 2017/2023

STANDARD 2017/2023



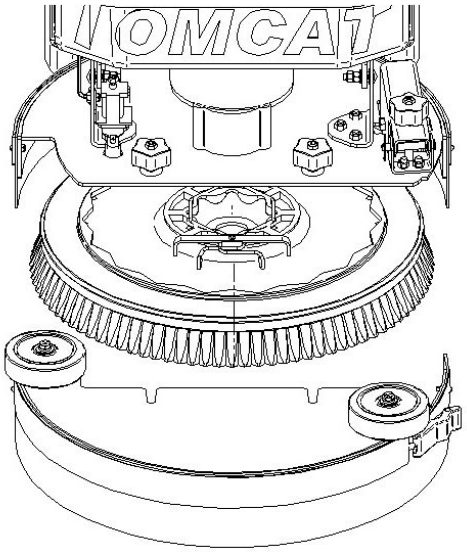
BRUSH ASSIST STRENGTH

First adjust the brush deck pressure to assure it is operating in the green area. Next, adjust the propulsion strength on a flat level part of the surface you are scrubbing. With the brush motor off, the brush head down and with the scrub brush or pad driver/pad combination you will be using adjust the propulsion strength. Test the amount of propulsion and readjust as necessary making sure to keep the brush pressure in the green area, Be careful that you do not set the propulsion level too high or the machine may become uncontrollable and unsafe or not perform acceptably.

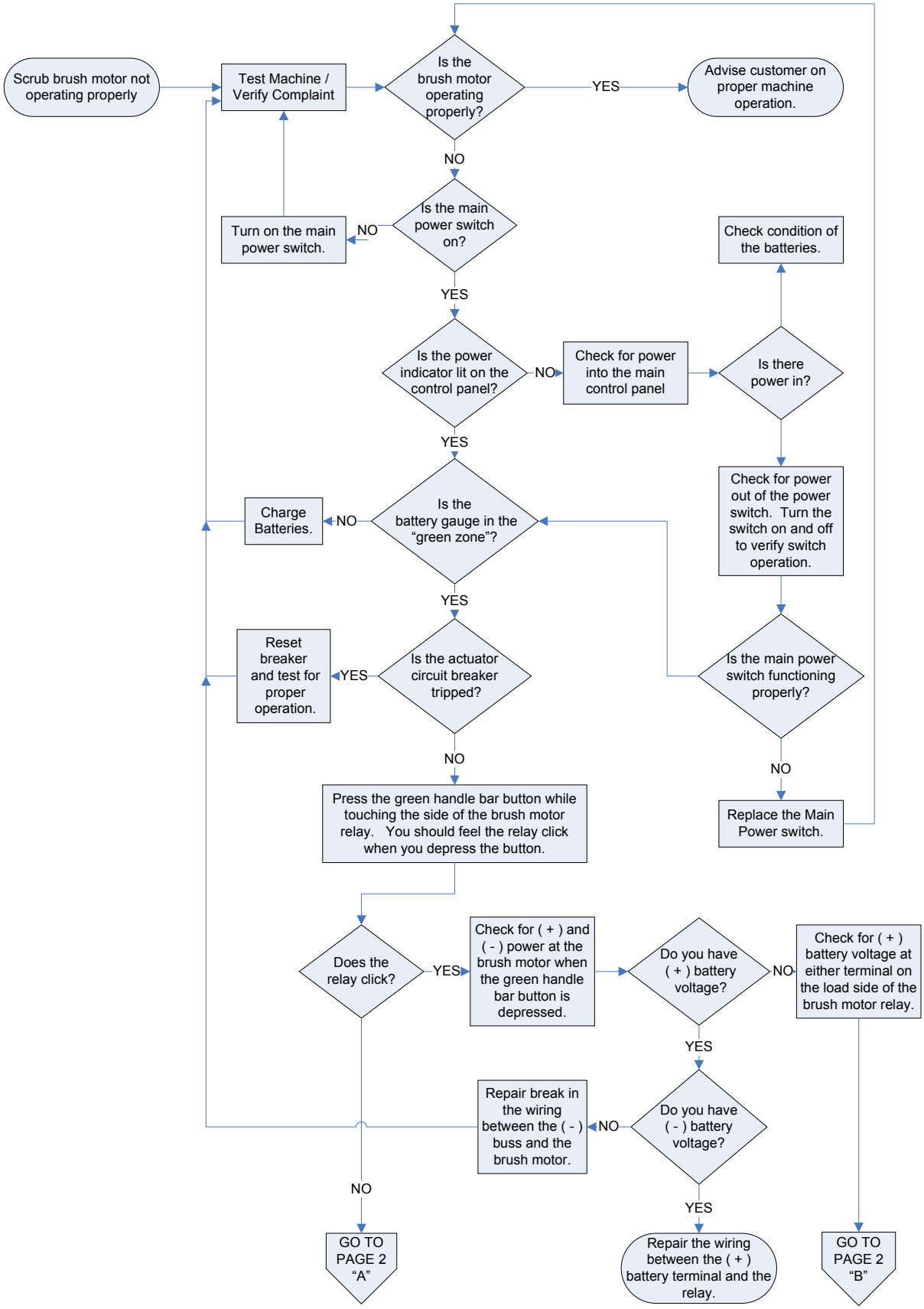
INSTALLING & REMOVING BRUSHES

Raise the brush deck as high as it will go with the brush deck switch. Turn machine power off. Loosen the two knobs at the front of the scrub deck and slide the shroud off the deck. Rotate the brush until both tabs of the spring clip are accessible. Squeeze the two tabs together and the brush will drop off.

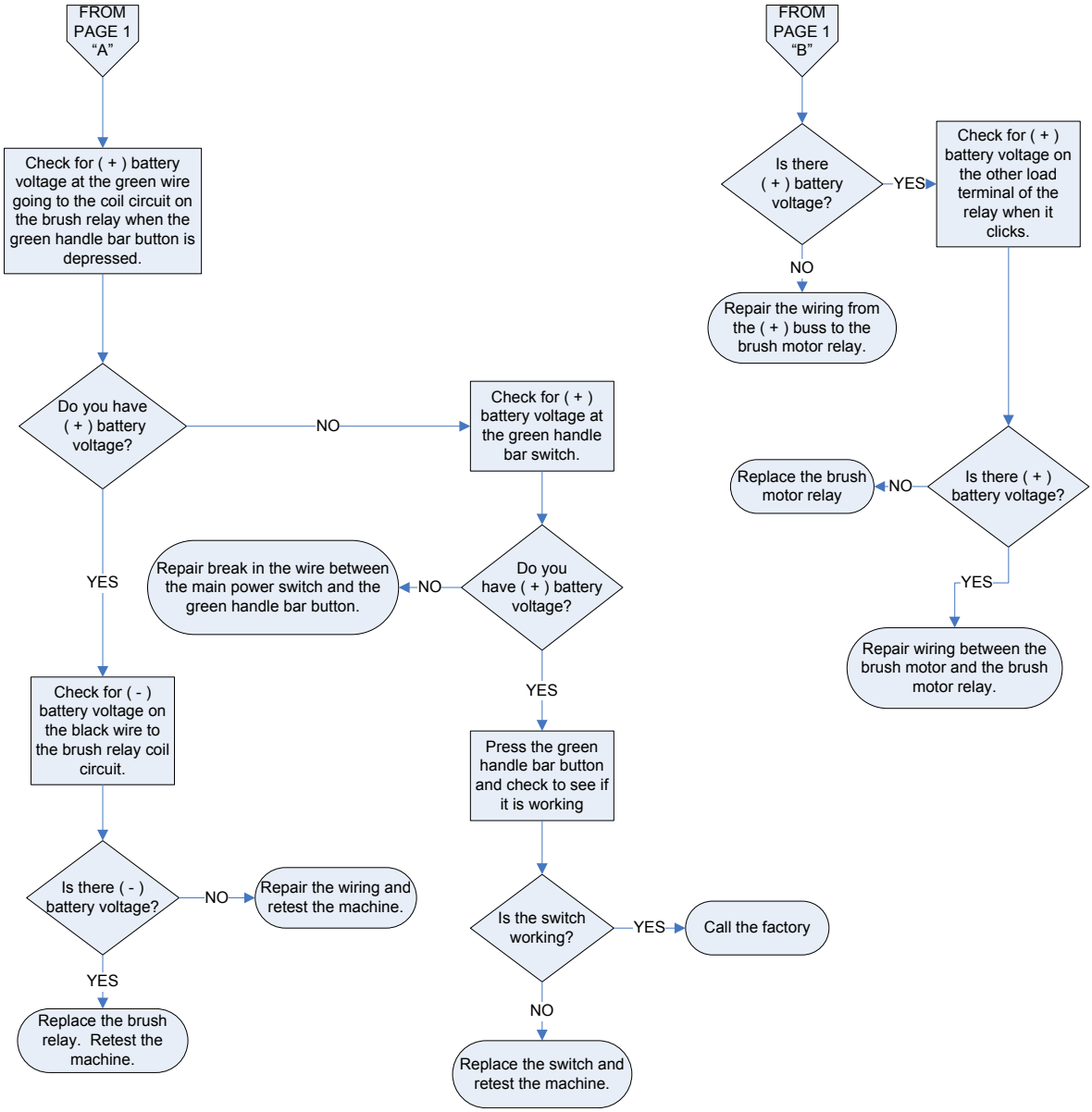
To install a brush reverse the procedure.



BRUSH DECK DIAGNOSIS FLOW CHART 1 of 2

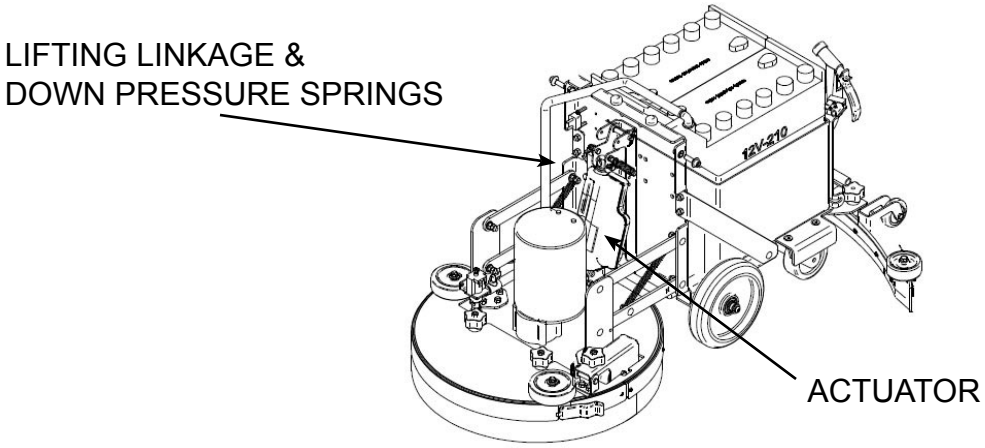

Scrub brush motor not operating properly
Test Machine / Verify Complaint
Is the brush motor operating properly?
YES
Advise customer on proper machine operation.
NO
Is the main power switch on?
NO
Turn on the main power switch.
YES
Is the power indicator lit on the control panel?
NO
Check for power into the main control panel
Is there power in?
Check condition of the batteries.
YES
Is the battery gauge in the "green zone"?
NO
Charge Batteries.
Check for power out of the power switch. Turn the switch on and off to verify switch operation.
YES
Is the actuator circuit breaker tripped?
YES
Reset breaker and test for proper operation.
Is the main power switch functioning properly?
NO
Replace the Main Power switch.
NO
Press the green handle bar button while touching the side of the brush motor relay. You should feel the relay click when you depress the button.
Does the relay click?
YES
Check for (+) and (-) power at the brush motor when the green handle bar button is depressed.
Do you have (+) battery voltage?
NO
Check for (+) battery voltage at either terminal on the load side of the brush motor relay.
YES
Repair break in the wiring between the (-) buss and the brush motor.
NO
Do you have (-) battery voltage?
NO
GO TO PAGE 2 "A"
YES
Repair the wiring between the (+) battery terminal and the relay.
GO TO PAGE 2 "B"

BRUSH DECK DIAGNOSIS FLOW CHART 2 of 2

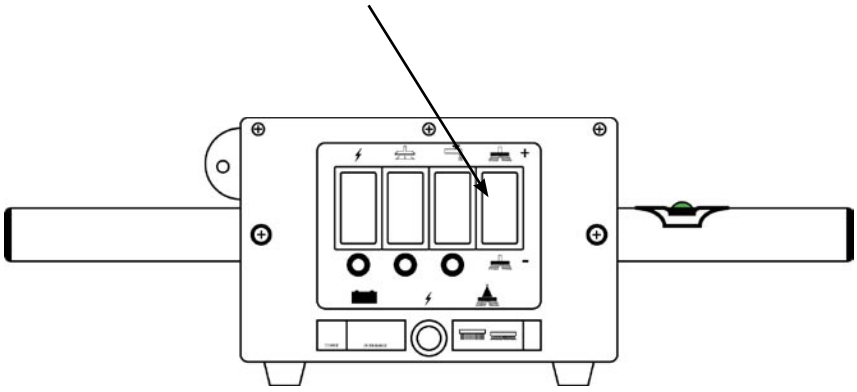

FROM PAGE 1 "A"
Check for (+) battery voltage at the green wire going to the coil circuit on the brush relay when the green handle bar button is depressed.
Do you have (+) battery voltage?
NO
Check for (+) battery voltage at the green handle bar switch.
Do you have (+) battery voltage?
NO
Repair break in the wire between the main power switch and the green handle bar button.
YES
Press the green handle bar button and check to see if it is working
Is the switch working?
YES
Call the factory
NO
Replace the switch and retest the machine.
YES
Check for (-) battery voltage on the black wire to the brush relay coil circuit.
Is there (-) battery voltage?
NO
Repair the wiring and retest the machine.
YES
Replace the brush relay. Retest the machine.
FROM PAGE 1 "B"
Is there (+) battery voltage?
YES
Check for (+) battery voltage on the other load terminal of the relay when it clicks.
NO
Repair the wiring from the (+) buss to the brush motor relay.
Is there (+) battery voltage?
NO
Replace the brush motor relay
YES
Repair wiring between the brush motor and the brush motor relay.

BRUSH LIFT SYSTEM

The brush lift system on the 2023 series consists of an actuator, a rocker switch, circuit breaker, lifting linkage and down pressure springs. The brush deck and motor are raised and lowered by the brush deck actuator. The actuator is controlled by a switch on the control panel. The actuator circuit is protected by a 2 amp, push-to-reset, circuit breaker on the back of the control panel.



The brush deck is raised and lowered using the rocker switch on the top of the control panel.

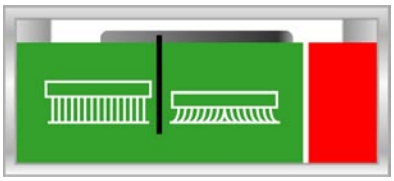


BRUSH LIFT ELECTRICAL CIRCUIT

The negative side of the battery is connected to the brush deck lift switch. Positive power from the main power switch is fed to the brush deck lift switch. The switch is then wired to the brush deck actuator with a 2 amp circuit breaker in line on the positive side. When the switch is depressed to lower the brush current is sent to the brush deck actuator to drive the brush deck down. When the switch is depressed to raise the brush deck current is sent in the other direction through the actuator raising the brush deck. The actuators travel is limited in both direction by internal limit switches. The limit switch for the raised position is fixed and the switch for the lowered position is adjustable.

DOWN PRESSURE

Down pressure is controlled manually by the operator raising or lowering the deck. The amount of down pressure is monitored using the brush pressure gauge located on the lower right corner of the control panel. This gauge should always be in the green when operating. If the gauge goes into the red there is too much brush pressure being applied.



STANDARD MODEL

HD MODEL

BRUSH LIFT SYSTEM ADJUSTMENTS

The brush lift system has two adjustments that can be made to it. The first adjustment is the length of travel of the actuator ram. This controls how far down it will allow the brush deck to go. The second adjustment is the upper linkage adjustment that controls how high the brush deck will lift off the floor .

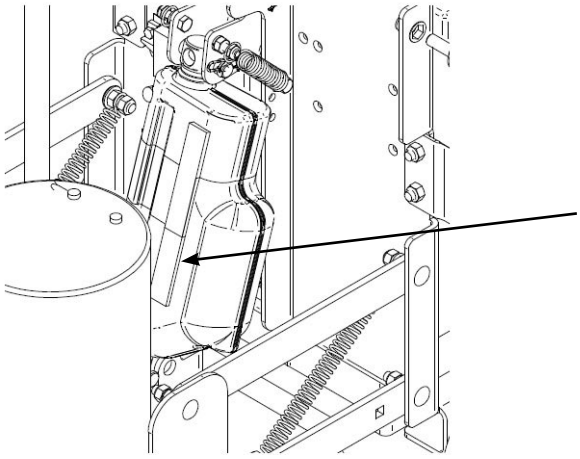
To access the actuator and its linkage the body of the machine must be tipped back. To do this you must first drain the solution and recovery tanks completely. Then use the Allen wrench located on the side of the scrub deck to remove the body hold down bolts. Once the body hold down bolts have been removed you can then use the handle bars to tip it backwards and rest it on the floor. After the adjustments have been made, tip up the body, replace body bolts and tighten, stow the body wrench and test the machine.

BRUSH LIFT ACTUATOR

The actuator must be able to extend enough to lower the brush head down so that it can reach slight dips in the floor. If the head can not do this the actuator may not be extending enough. The distance the actuator extends is controlled by a limit switch that is housed internally in the actuator.

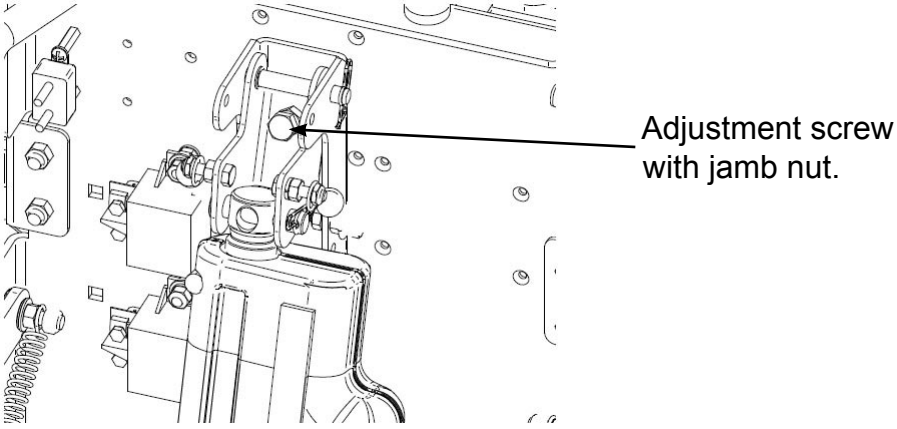
ACTUATOR ADJUSTMENT

To access the limit switch in the actuator remove the black rubber strip on the face of it. Loosen the set screw just enough for the switch to slide. To increase the travel of the deck slide the limit switch down toward the floor. To increase the travel slide the limit switch up towards the top of the machine. When the switch is repositioned gently tighten the set screw and replace the black rubber strip.



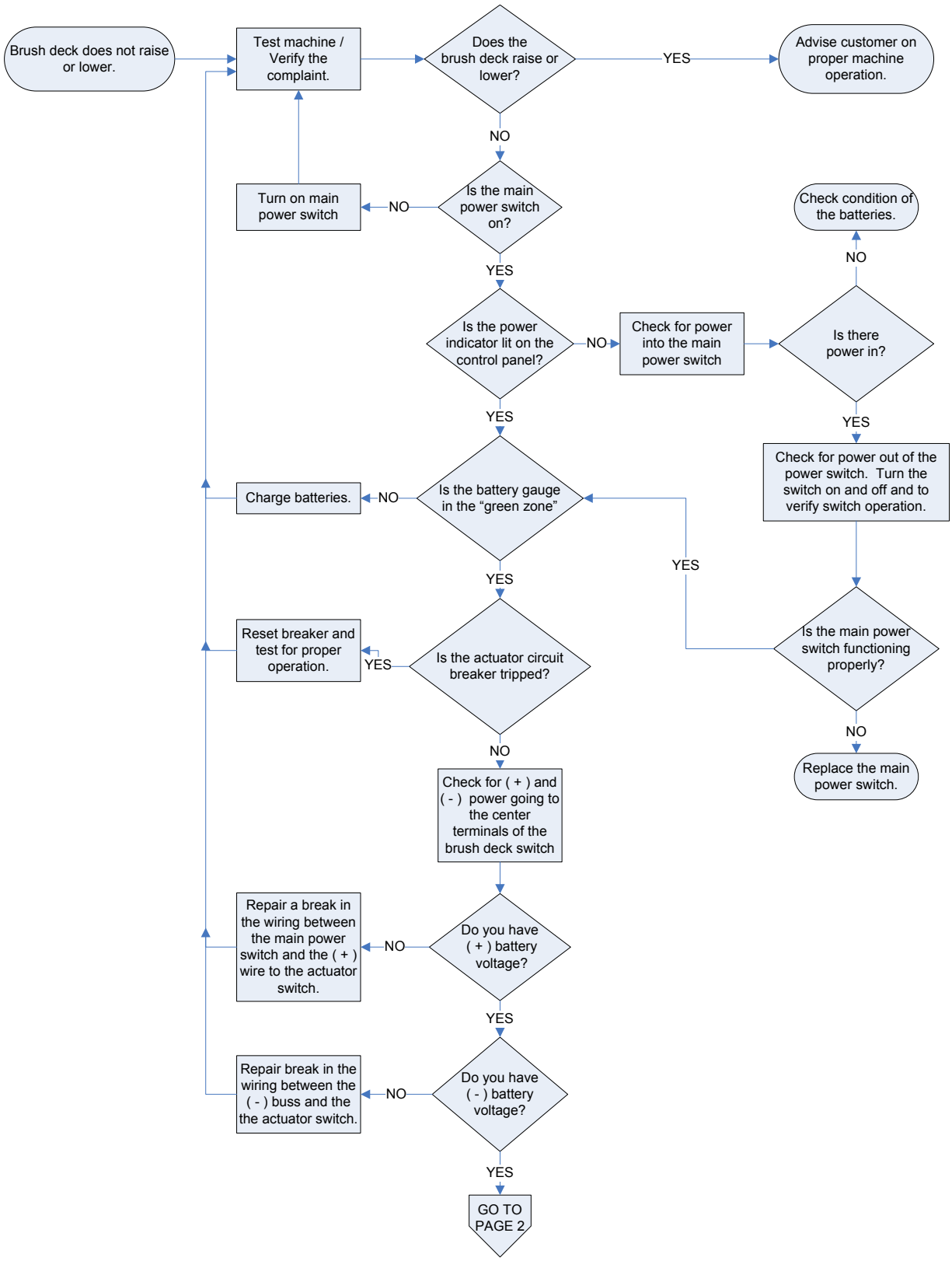
LINKAGE ADJUSTMENT

If the brush deck is out of adjustment and it can not be remedied with the limit switch adjustment there is a provision for adjusting the linkage. At the top of the brush deck lift linkage there is a bolt that is secured with a jamb nut. This bolt is used to increase or decrease the raised height of the deck. If too much adjustment is made to this screw to lift the head, the deck may not have enough travel to reach and put pressure on the ground.

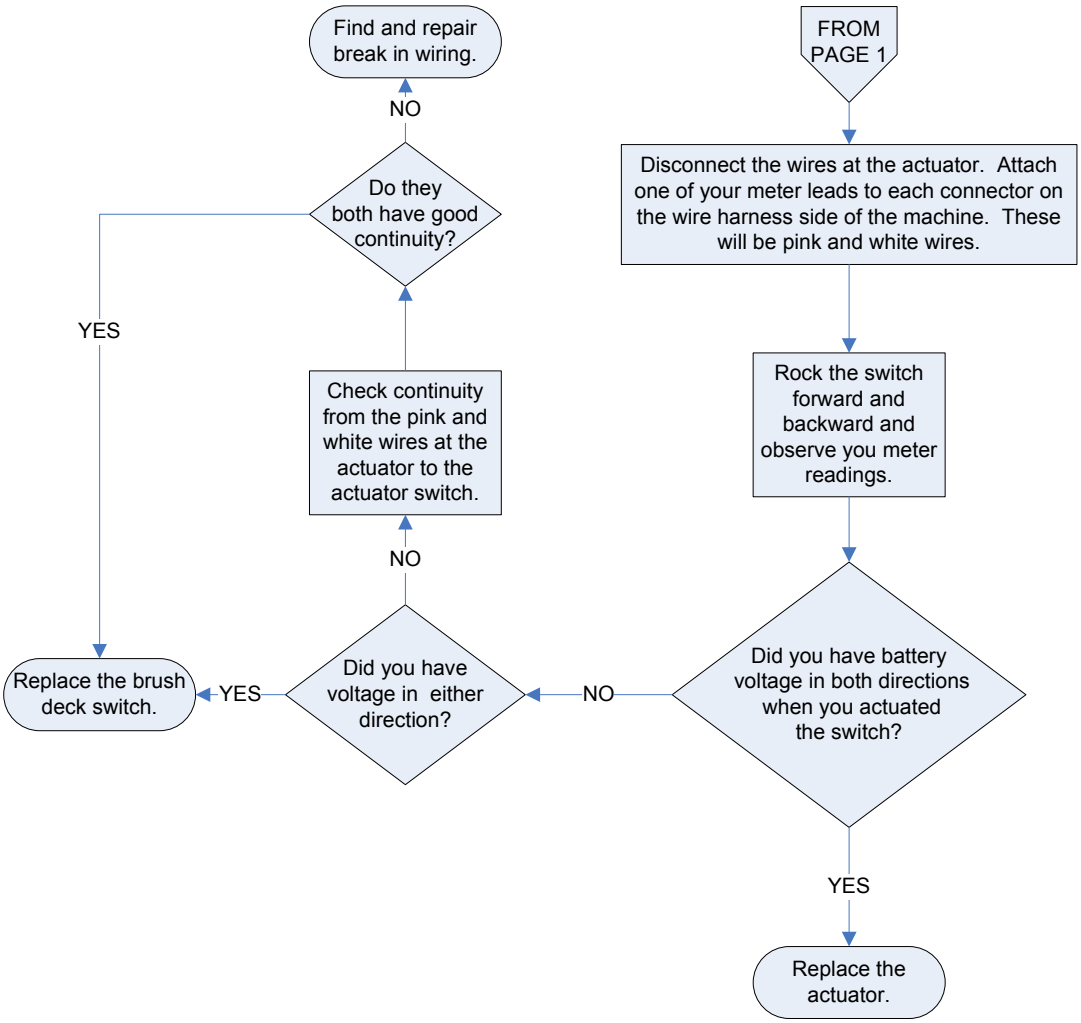


If the brush head lifts too high when it is in the full-raised position it may not have enough travel to extend low enough to reach into recesses in the floor. If the machine exhibits this condition, lower the overall brush height by backing out the screw on the upper suspension arm.

BRUSH DECK LIFT DIAGNOSIS FLOW CHART 1 of 2


Brush deck does not raise or lower.
Test machine / Verify the complaint.
Does the brush deck raise or lower?
YES
Advise customer on proper machine operation.
NO
Is the main power switch on?
NO
Turn on main power switch
YES
Is the power indicator lit on the control panel?
NO
Check for power into the main power switch
Is there power in?
NO
Check condition of the batteries.
YES
Check for power out of the power switch. Turn the switch on and off and to verify switch operation.
YES
Is the battery gauge in the "green zone"
NO
Charge batteries.
YES
Is the main power switch functioning properly?
NO
Replace the main power switch.
YES
Is the actuator circuit breaker tripped?
YES
Reset breaker and test for proper operation.
NO
Check for (+) and (-) power going to the center terminals of the brush deck switch
Do you have (+) battery voltage?
NO
Repair a break in the wiring between the main power switch and the (+) wire to the actuator switch.
YES
Do you have (-) battery voltage?
NO
Repair break in the wiring between the (-) buss and the the actuator switch.
YES
GO TO PAGE 2

BRUSH DECK LIFT DIAGNOSIS FLOW CHART 2 of 2


FROM PAGE 1
Disconnect the wires at the actuator. Attach one of your meter leads to each connector on the wire harness side of the machine. These will be pink and white wires.
Rock the switch forward and backward and observe you meter readings.
Did you have battery voltage in both directions when you actuated the switch?
YES
Replace the actuator.
NO
Did you have voltage in either direction?
YES
Replace the brush deck switch.
NO
Check continuity from the pink and white wires at the actuator to the actuator switch.
Do they both have good continuity?
YES
NO
Find and repair break in wiring.

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TRACTION DRIVE SYSTEM

The 2023 model is not currently offered with a drive option.

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CHASSIS SYSTEM

The chassis system in built on a heavy duty 7 gauge powder coated full frame. The frame gives the machine great strength and durability. Everything is fastened to the frame using stainless steel hardware allowing for easy servicing should a repair be needed. The machine rolls on two 8” rubber tires and two 4” poly casters providing solid stable operation.

CHASSIS REPLACEMENT

In the unlikely even that the chassis must be replaced due to collision or damage it can easily be done. We recommend moving the components piece by piece, installing the tank last on the new chassis.

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BATTERIES

BATTERY SAFETY

DANGER OF EXPLODING BATTERIES

Batteries contain sulfuric acid and produce explosive mixtures of hydrogen and oxygen. Because self-discharge action generates hydrogen gas even when the battery is not in operation. Make sure batteries are stored and worked on in a well ventilated area. ALWAYS wear ANSI Z87.1 (U.S. Standard) approved safety glasses and face shield or splash proof goggles when working on or near batteries.

Always wear proper face, eye and hand protection.
Keep all sparks, flames and forms of combustion away from the battery.
Never try to open a battery with non-removeable vents.
Keep removable vents tight and level except when servicing electrolyte.
Make sure work area is well ventilated.
Never lean over battery while boosting, testing or charging.
Exercise caution when working with metallic tools or conductors to prevent short circuits and sparks.

SAFE CHARGING

Never attempt to charge a battery without first reviewing the instructions for the charger being used. In addition to the manufacturer's instructions, these general precautions should be followed:

SAFETY PRECAUTIONS

Always wear proper eye, face and hand protection.
Always charge batteries in a well ventilated area.
Keep vents tight and level.
Turn the charger and timer "OFF" before connecting the leads to the battery to avoid dangerous sparks.
Never try to charge a visibly damaged or frozen battery.
Connect the charger leads to the battery; red positive (+) lead to the positive(+) terminal and black negative(-) lead to the negative (-) terminal. If the charger is equipped with a quick disconnect plug use that to connect it to the machine.
Make sure that the machine and all its accessories are turned off.
Make sure that the charger leads to the battery are not broken, frayed or loose.
Set the timer, turn the charger on and slowly increase the charging rate until the desired charging rate is reached.
If the battery becomes hot, or if violent gassing or spewing of electrolyte occurs reduce the charging rate or turn off the charger temporarily.
Always turn the charger "OFF" or unplug it from the AC power before removing the charger leads from the battery or disconnecting the quick disconnect plug to avoid dangerous sparks.

HANDLING BATTERY ACID

Battery acid, or electrolyte, is a solution of sulfuric acid and water that can destroy clothing and burn the skin. Use extreme caution when handling electrolyte and keep an acid neutralizing solution - such as baking soda or house hold ammonia mixed with water - readily available. When handling batteries:

Always wear proper eye, face and hand protection.
If the electrolyte is splashed into an eye, immediately force the eye open and flood it with clean, cool water for at least 15 minutes. Get prompt medical attention.
If electrolyte is taken internally, drink large quantities of water or milk. DO NOT induce vomiting. GET IMMEDIATE MEDICAL ATTENTION.
Neutralize with baking soda any electrolyte that spills on a machine or in a work area. After neutralizing, rinse contaminated area clean with water.

WATER

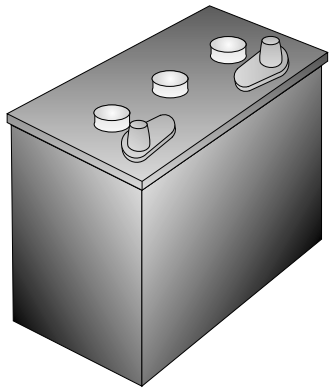
When servicing batteries the recommended water to use is distilled water when adding it to the electrolyte. However, any water that is safe to drink, with the exception of mineral or flavored waters, is safe to use in a battery. Do not use water with a high mineral content. Avoid using metal containers to store acid or water. The metal impurities in the water will diminish the performance of the battery. Liquids besides water such as vinegar, anti-freeze, salt water and alcohol or harmful acids such as nitric, hydrochloric or acetic will cause severe grid damage and completely ruin a battery.

BATTERY TERMINAL TYPES

Batteries are made with an assortment of different battery terminal configurations. The most common in the industry are listed here. It is best to replace batteries with the exact type of battery that was in the machine including the battery terminal type. If you change battery terminal types the battery cables must be changed to match the new style terminals..

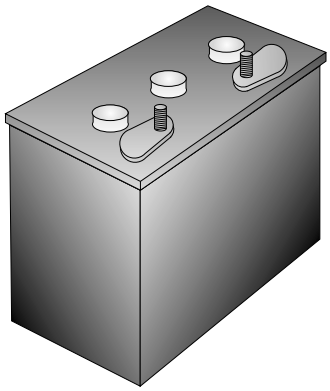
Tapered Top Terminal (S.A.E. Post)

The tapered top design uses terminal posts built to SAE standards so that all SAE style clamps will fit any battery with these posts. The negative terminal is made slightly smaller than the positive to reduce the possibility of hooking up a battery in reverse.



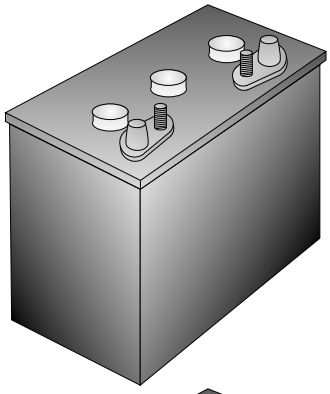
Stud Terminal

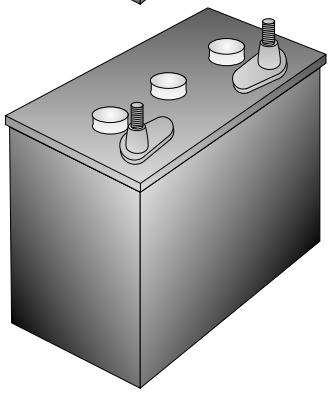
The stud terminal is typically used on heavy duty batteries. The terminals have a stainless steel threaded stud embedded in them that the connections are made to.



Combination Terminal

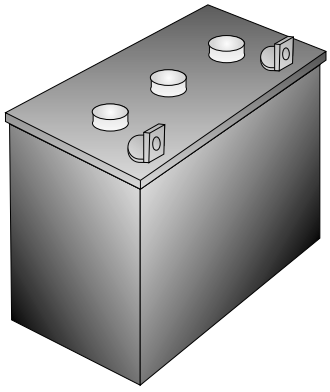
The combination terminals come in a few different configurations. The two most common configurations are the “side by side” and the stacked. In the side by side there is a tapered top terminal with a stud terminal right next to it. In the stacked configuration the stainless steel stud is embedded into the taper top terminal. The combination terminals make it possible to use the battery with a variety of equipment without having to change the cables on it. CAUTION: The “stacked type” combination battery terminals are very tall in comparison to all other configurations. Make sure to check all clearances before trying to close a cover or a tank on top of these types of batteries.





The “L” Terminal

The “L” type terminal is used on many special application batteries.



BATTERY SYSTEM

The battery system for the 2023 models consists of 2 deep cycle batteries. They are offered in 2 different sizes of lead acid and one size of maintenance free gel battery for each machine. The batteries are the power source for all of the working parts of the machine and must be maintained properly to realize optimal run time as well as longevity.

Deep cycle batteries provide large storage capacity of the electricity that powers the scrubber. There are two types of batteries that we use in our scrubber and each one has different needs to keep it performing optimally.

BATTERY MAINTENANCE & CARE

LEAD ACID BATTERIES (TRADITIONAL)

Lead Acid Batteries are the most common battery installed in our machines. They are filled with water and battery acid and require periodic care. The most important item to attend to is the battery water level. This must be checked on a weekly basis because if the batteries run low on water they will be ruined. Batteries should be checked before you charge them to make sure they have enough water to cover the plates inside them. In the event that the water is below the tops of the plates water should be added to bring the level just above the top of the plates. When adding water ALWAYS use distilled water. Tap water contains things like minerals and chlorine that is detrimental to a battery. Batteries should be charged each time the machine is used for any significant time. Batteries should never be discharged more than 80% of their capacity. The battery gauge is to alert you when it is time to stop using the machine and recharge it. The tops of the batteries must be kept clean and dry or they will induce a current leak across the top of the battery.

LEAD ACID BATTERIES (MAINTENANCE FREE)

Some of our machines are equipped with ‘Maintenance free” lead acid batteries. The major difference between these and the “traditional” type of lead acid battery is that you can not check or fill the water in them.

GEL CELL BATTERIES

Gel Cell batteries are a maintenance free battery design that has no liquid to spill out in the event that a machine would be tipped over or some other disaster were to occur. The batteries perform well but not as well as a “traditional” flooded wet cell. With gel cell batteries there is no water level to check so there is less maintenance involved. With gel batteries the machine should be charged anytime it is used for any significant length of time. Gel cell batteries should never be discharged below 60% of their capacity, 21 volts on this machine, or it will cause rapid failure of the battery.

BATTERY CABLES & TERMINALS

The battery cable connections must remain tight and corrosion free. In the event that the battery cables or terminals become corroded follow accepted battery safety precautions, disassemble and clean the terminals with a baking soda and water solution and a wire brush, making sure not to get any INSIDE the battery. Once the terminals and cables are clean and dry, inspect them thoroughly for any damage or signs of arcing or over-heating. Replace and damaged cables, terminals or batteries. Reassemble the cables and batteries and coat terminals and connections with a battery terminal protectant.

IMPORTANT NOTE! Make sure to apply the protectant AFTER the batteries and cables are reassembled and tightened. Putting protectant on before assembly and tightening can lead to a fire.

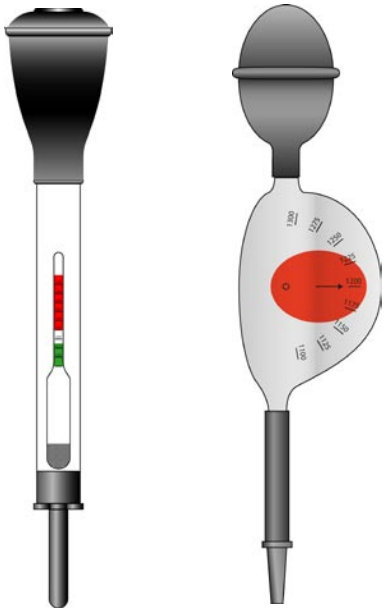
BATTERY TESTING

As a battery pack ages, the batteries will slowly loose their ability to accept and hold a charge. This will usually be noticed by a decrease in run time of the machine. Neglected batteries will “wear out” much faster than well-maintained batteries but give you similar symptoms when they do fail. The proper way to check a battery pack’s condition is with a battery discharge unit. To use the discharge unit make sure the batteries are maintained properly and fully charged. Attach the discharge unit to the machines battery pack and turn the machine on. Record your results and compare them to your battery’s rated capacity. This will let you know how much capacity your battery pack has left. If you find through the battery discharge meter that you have reduced capacity you can test each individual battery to find out if you have one bad battery or multiple bad batteries. To test each battery you have 2 options, a hydrometer test or a load test.

Hydrometer test:
Use a hydrometer on each cell in the battery pack to check it’s specific gravity.

HYDROMETERS

There are 3 types of hydrometers typically available. We do not recommend the floating ball type as they are not very accurate and give minimal information regarding the batteries condition. The traditional “float type” hydrometer and the “EZ Red” or dial type hydrometer give a numeric reading of each battery cell’s state of charge.



FLOAT TYPE DIAL TYPE

The state-of-charge of a lead acid battery can be determined by the specific gravity of the electrolyte (its weight compared to water). The specific gravity can be measured directly with a hydrometer or determined by the stabilizing voltage.

A hydrometer is a bulb-type syringe which will extract electrolyte from a cell. A glass float or a plastic disk in the hydrometer body is calibrated to read in terms of specific gravity. A common range of specific gravity used on these floats is 1.160 to 1.325. Do not assume a battery will not take a charge because you have been charging it for a while and the float will not rise. The battery may have been fully discharged and will require considerable charging time before reaching the minimum specific gravity on the float.

The lower the float sinks in the electrolyte, the lower its specific gravity. The proper way to read a hydrometer is to dray electrolyte into the body of the hydrometer while holding it vertically so the float is not rubbing on the side of it Draw an amount of acid into the body so the that with the bulb fully expended, the float will be lifted free not touching either side, the top or the bottom. Your eye should be level with the surface of the liquid in the hydrometer body. Disregard the curvature of the liquid where the surface rises against the float stem and the barrel due to surface tension. Keep your hydrometer and it's float clean. Check them frequently for cracks.

The following table illustrates typical specific gravity values for a cell in various stages of charge with corresponding voltage readings.

OPEN CIRCUIT VOLTS	STATE OF CHARGE	HYDROMETER READING
12.65	100%	1.260 or more
12.45	75%	1.225 - 1.260
12.24	50%	1.190 - 1.225
12.06	25%	1.120 - 1.190
11.89	Totally Discharged	1.120 or less

When testing with a load tester you are looking for a difference between cells of the batteries. All the battery cells should have similar readings. Any battery that contains a cell that has a value lower than .050 of the rest of the cells indicates you have a bad battery.

LOAD TESTING

Load test with a load tester:
Make sure batteries are fully charged. Disconnect batteries from the machine and each other so each battery can be tested individually. Using a battery load tester test each battery at either the fixed load of the tester or a 120 amp of load on a variable tester. The batteries should be able to maintain a voltage of 10.8 volts or greater for 15 seconds on 12 volt batteries and 4.9 volts or greater for 15 seconds on a 6 volt battery. If they can not maintain their voltage while under load they are bad.

Load test using machine systems as a load:
Using a volt meter measure the voltage of each battery while the machine is under full load (all systems operating). If any battery shows a voltage of less than 80% of the battery with the highest voltage that battery is bad.

BATTERY REPLACEMENT

When replacing batteries in a machine it is important to replace them with quality batteries that are designed for high-output deep-cycle applications, such as the ones furnished by the factory when the machine was new. All batteries are NOT created equal. In the event you are considering other manufactures batteries make sure to compare their 75 AMP RESERVE CAPACITY. That is the ONLY specification that corresponds to the usage the batteries will be seeing.

When a battery fails in the first 12 months of operation replacing a single battery may be acceptable if the failure was caused do to manufacturing defect. If the battery pack is older than 12 months or the battery has failed due to neglect the entire battery pack should be replaced as the batteries operate as a system.

When replacing batteries it is important to neutralize any battery acid that is in or on the machine after battery removal. Clean and dry the machine after neutralization and removal of any acid. The batteries should be installed in a clean and dry machine.

When installing batteries a terminal protectant should be used to help inhibit battery terminal corrosion. It is important to use a product specifically designed for this and not things like grease, silicone or paint. Read and follow the directions on the can of protectant exactly to prevent terminal or cable failure.

BATTERY CHARGERS

The charger supplied with the 2023 is a fully automatic charger. To operate the charger all that needs to be done is plug it into the machines charger port and then plug it into the wall. Once the charger is plugged into both the charger port on the machine and a wall outlet it will run until the batteries are fully charged and then shut off. It is important to let the charger finish its charge cycle before disconnecting it as the last few hours of a charge cycle are very important.

The charger has an amp meter on the face of it to show how much electricity is being put into the batteries and it gives some idea of where the charger is in its cycle. Typically on a good set of batteries when you plug in the charger and it turns on, the meter will move rapidly to the high end of the amp scale. As the charge cycle progresses, the meter will fall towards zero. The charger shuts off automatically when the cycle is complete, this is evident by it not humming anymore.

IMPORTANT NOTE! DO NOT unplug a charger's DC plug from the machine while the charger is running. This can cause an electrical arc that can ignite any flammable gasses that are in the area from either the batteries being charged or other environmental sources. There is also the possibility of damaging the charger should it be unplugged from the DC current side while charging.

ELECTRICAL SYSTEM

The electrical system on the 2023 was designed with simplicity being a core quality. In designing the system this way it is not complicated by a computer and is very basic to repair. All the circuits are controlled by either switches, relays or a combination of the two. The circuits are protected by push to reset circuit breakers located on the rear of the control panel. The battery gauge and the brush pressure meter are both analog gauges and all status lights are simple 24 volt indicator bulbs.

SWITCHES

The switches we use all have a similar face but are configured differently internally.

RELAYS

The early machines used Cole Hersee contactor type relays (silver can style) and the later machines use Bosch relays (black plastic boxes).

MOTORS

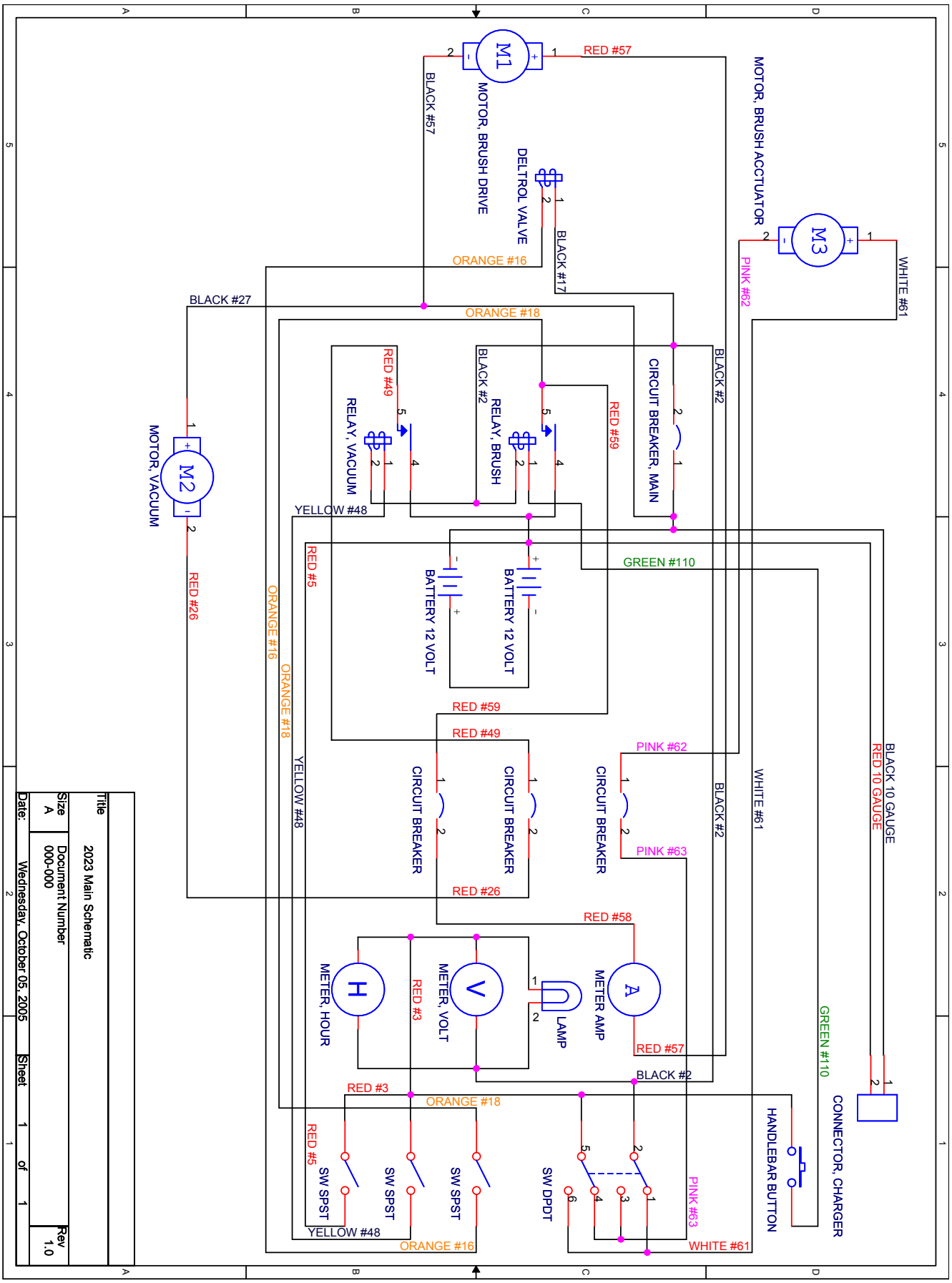
The motors that are used through out the machine are designed to be very durable and give long service life. The brush deck motor is a permanent magnet gear reduction type to give large amounts of power for scrubbing. The vacuum motor is a very high speed motor that develops vacuum for the recovery system.

ACTUATORS

The 2023 uses only one actuator for the brush head. This is a heavy duty 500 lb. actuator that has internal limit switches.

WIRING

The wiring on the machine is numbered for easy circuit determination and to be easy to trace. We over size our wiring to eliminate failures and for safety reasons.


M1
MOTOR, BRUSH DRIVE
RED #57
BLACK #57
DELTROL VALVE
ORANGE #16
BLACK #17
MOTOR, BRUSH ACCTUATOR
M3
PINK #62
WHITE #61
BLACK #27
ORANGE #18
M2
MOTOR, VACUUM
RED #49
RELAY, VACUUM
BLACK #2
RELAY, BRUSH
RED #59
CIRCUIT BREAKER, MAIN
BLACK #2
YELLOW #48
GREEN #110
RED #5
BATTERY 12 VOLT
BATTERY 12 VOLT
RED #26
ORANGE #16
ORANGE #18
YELLOW #48
RED #59
RED #49
CIRCUIT BREAKER
CIRCUIT BREAKER
CIRCUIT BREAKER
PINK #62
PINK #63
BLACK #2
WHITE #61
BLACK 10 GAUGE
RED 10 GAUGE
RED #26
RED #58
METER, HOUR
METER, VOLT
RED #3
LAMP
METER AMP
RED #57
BLACK #2
RED #3
ORANGE #18
RED #5
SW SPST
SW SPST
SW SPST
SW DPDT
PINK #63
HANDLEBAR BUTTON
CONNECTOR, CHARGER
GREEN #110
YELLOW #48
ORANGE #16
WHITE #61
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2023 Main Schematic
Size
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Document Number
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Rev
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Wednesday, October 05, 2005
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2/16/2006 # 2023-01 SHROUD CURTAIN ADJUSTMENT

TIME REQUIRED: 10 MINUTES

NUMBER OF TECHS: 1 PERSON

REQUIRED PARTS

none

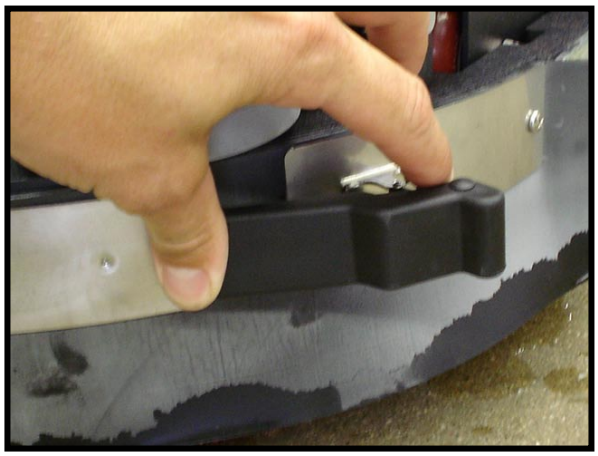
REQUIRED TOOLS

none

1. Make sure machine is on level floor.

2. Release the black latch on left side of the shroud. (see figure below)

NOTE: On the right and left side of shroud there are Qty: (2) 10/32 x1/2 screws one on each side, they are left slightly loose so band and curtain can slide up and down.



3. Adjust curtain an even amount from floor all the way around.

   NOTE: Recommended adjustment would be 1/16'' to 1/8'' from floor to control water.

4. Reconnect latch and snap close.

2/16/2006

2023-02 SCRUB DECK ACTUATOR R&R

TIME REQUIRED: 20 MINUTES

NUMBER OF TECHS: 1 PERSON

REQUIRED PARTS

- Qty: (1) 190-2210 ACTUATOR

REQUIRED TOOLS

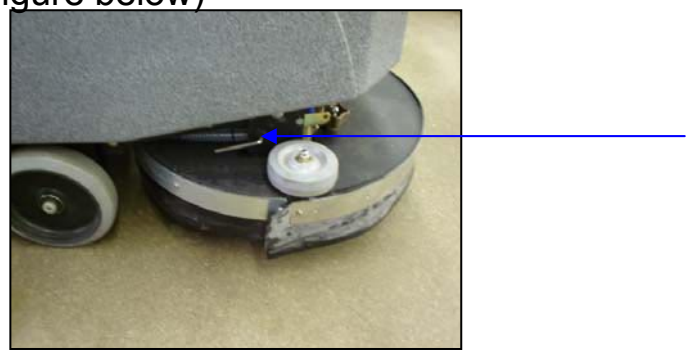
- 7/16'' 12- point box wrench
- 9/16'' 12- point socket
- needle nose pliers
- Qty: (2) 2'' x 4''x24'' wood boards

COMPLETELY DRAIN SOLUTION & RECOVERY TANKS

MAKE SURE MACHINE IS ON LEVEL GROUND AND WHEELS ARE CHOCKED AND SCUB DECK IS IN UP POSITION.

OPENING TANK

1. Locate and remove the 3/16'' Allen wrench on the right side of scrub deck. (see figure below)



2. Locate and remove the two 5/16''-18 x 3'' bolts that are in the relief ports on the left and right sides of machine.

Relief port

3. Carefully lean tank back to expose battery compartment.

DISCONNECT BATTERIES

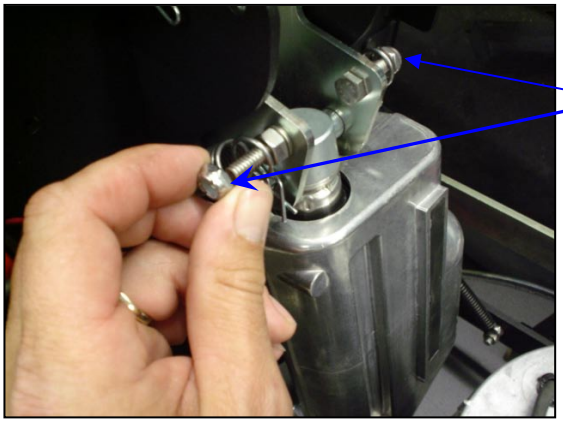
1. Locate the positive terminal that is in front left of battery pack.
2. Using a 9/16'' 12- point socket loosen and remove the 5\16'' nut.
3. Remove the red cable and secure away from terminal .(See figure below)

REMOVING SCRUB DECK ACTUATOR

1. Locate the wiring harness that is behind the actuator.
2. Using a needle nose pliers carefully disconnect the male to female connecters on the red to pink wires and orange to white wires that lead from the actuator to wiring harness .(see figure on the top page 3)

(Red and orange wires not Shown)

3. Using a 7/16 12-point box wrench loosen and remove the (Qty 2) ¼-20 jam nylock nuts that holds the down pressure springs to the actuator anchor and the actuator arm.(see figure below)
4.

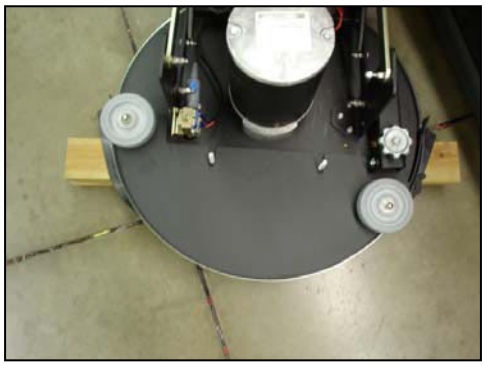


¼ -20 jam nylock nuts

5. Remove the down pressure springs from the top stud. (see figure below)

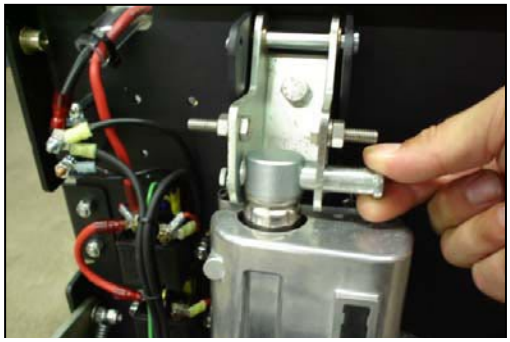
Down pressure Spring

6. Using Qty :(2) 2’’x 4’’x24’’ wood boards stack them up and put them under the center of the scrub deck. (see figure below) *NOTE: You may have to lift on scrub deck slightly to install 2’’x4’’x24’’wood boards.* ***NOTE: MAKE SURE THE BOARDS ARE SUPPORTING THE FULL WEIGTH OF THE SCRUBDECK.***



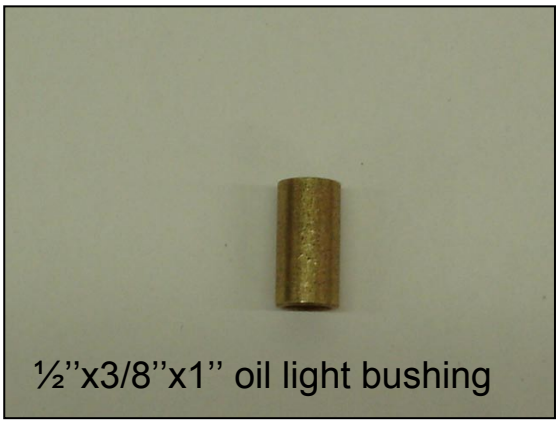
7. Using a needle nose pliers remove the1/2’’ Rue Ring Cotter pin that is located at the top of the actuator.(see figure below)

8. Remove the ½’’x 2’’long clevis pin.(see figure below)



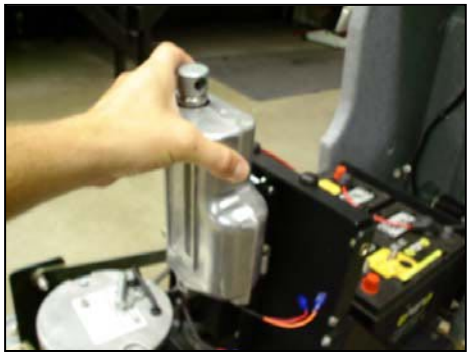
9. Using a needle nose pliers remove the 3/8'' Rue ring cotter.(see figure below)

10. Remove the 3/8''x2 ½'' clevis pin. (see figure below)*NOTE: There is a ½''x3/8''x1'' oil light bushing in this hole, make sure to misplace it.(see figure below)*



½''x3/8''x1'' oil light bushing

11. Remove actuator. (see figure below)



2/16/2006 **2023-02 SCRUB DECK ACTUATOR R&R** Page 6 of 6

INSTALLING NEW ACTUATOR

1. Hold new actuator with movable shaft in up position.
2. Install the ½''x 2'' clevis pin on the top of actuator to the machine.
3. Install the ½'' Rue ring cotter.
4. Install the ½''x 3/8''x1'' oil light bushing in bottom hole of actuator.
5. Install the 3/8''x 2 ½'' clevis pin on bottom of actuator.
6. Install the 3/8'' Rue ring cotter.
7. Reinstall the Qty :(2) down pressure springs.
8. Reinstall the Qty :(2) ¼''x20 jam nylock nuts.
9. Reconnect the male and female wire connectors.

NOTE: RED wire to PINK wire and ORANGE wire to WHITE wire.

10. Reconnect batteries
11. Close tank and reinstall the 5/16''-18 x 3'' bolts in relief ports and tighten using the 3/16'' Allen wrench.
12. Reinstall 3/16'' Allen wrench back in location.

2/16/2006

2023-03 SOLUTION FLOW VALVE R&R

TIME REQUIRED: 15 MINUTES

NUMBER OF TECHS: 1 PERSON

REQUIRED PARTS

- Qty: (1) 190-4500 solution flow valve
- Qty: (1) 8'' wire tie

REQUIRED TOOLS

- 7/16'' 12- point box wrench
- 7/16'' 12 - point socket
- 3/16'' flat head screw driver
- 13/16'' open end wrench
- side cutters
- 9/16'' 12- point socket

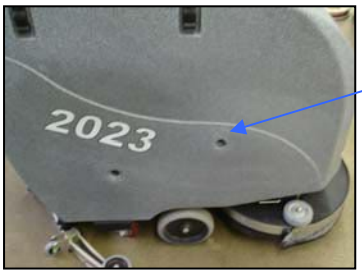
COMPLETELY DRAIN SOLUTION & RECOVERY TANKS

MAKE SURE MACHINE IS ON LEVEL GROUND, WHEELS ARE CHOCKED AND SCUB DECK IS IN UP POSITION.

OPENING TANK

1. Locate and remove the 3/16'' Allen wrench on the right side of scrub deck. (see figure below)

2. Locate and remove the two 5/16''-18 x 3'' bolts that are in the relief ports on the left and right sides of machine.

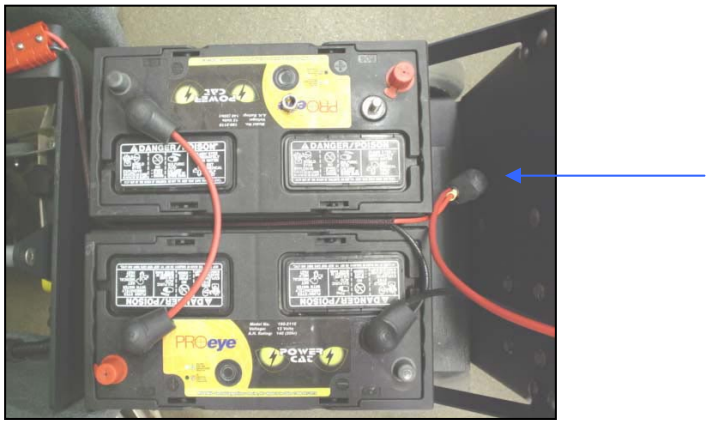


NOTE: IF MACHINE HAS KEY SWITCH, REMOVE KEYS BEFORE NEXT STEP.

3. Carefully lean tank back to expose battery compartment.

DISCONNECTING BATTERIES

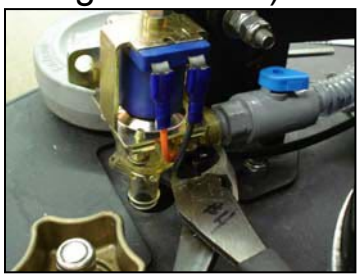
1. Locate the positive terminal that is in front left of battery pack.
2. Using a 9/16'' 12- point socket loosen and remove the 5\16'' nut.
3. Remove the red cable and secure away from terminal .(See figure below)



REMOVING SOLUTOIN FLOW VALVE

1. Using a 3/16'' screw driver loosen the ½'' hose clamp that holds the ½'' reinforced hose to the ball valve. (see figure below)

2. Using a side cutters, cut the wire tie that holds the orange and black wires to valve. (see figure below)

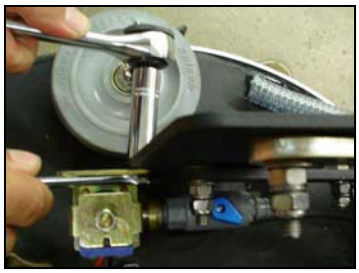


3. Using a needle nose pliers, carefully remove the orange and black wire from valve. (see figure below)

4. Remove the ½'' reinforced hose from the ball valve. (see figure below)

5. Using a 13/16'' open end wrench carefully loosen and remove the ball valve from the solution flow valve.

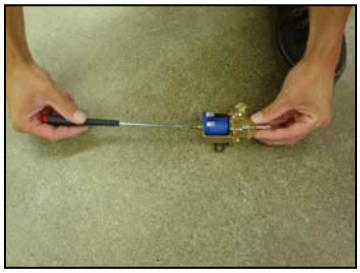
6. Using a 7/16'' 12-point socket and a 7/16'' 12 point box wrench loosen and remove the ¼''- 20x1/2'' bolt and jam nut. (see figure below)



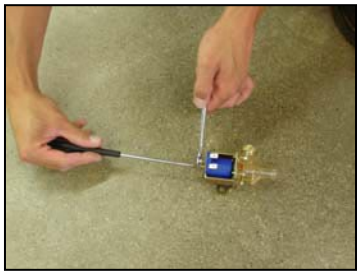
7. Remove the solution flow valve.
NOTE: Before installing new solution flow valve check adjustment.

ADJUSTING NEW SOLUTION VALVE

1. Using a 7/16'' 12-point box wrench loosen the ¼'' – 20 nut.
2. Using a 3/16'' flat head screw driver, back adjustment screw all the way out. (see figure below)



3. Using a 3/16'' flat head screw driver to hold adjustment, tighten the ¼''-20 nut using a 7/16'' wrench to lock adjustment. (see figure below)



REINSTALLING SOLUTION FLOW VALVE

1. Hold new solution flow valve in position and install the ¼''-20x1/2'' bolt and ¼''20 nut and tighten.
2. Reinstall the ball valve onto solution flow valve and tighten using a 13/16'' open wrench. *NOTE DON'T OVER TIGHTEN.*
3. Reinstall ½'' hose and clamp on to ball valve and tighten the ½'' hose clamp using a 3/16'' flat head screw driver.
4. Reconnect the orange and black wire to the solution flow valve.
5. Reinstall the 8'' wire tie to hold the orange and black wire to the solution flow valve.
6. Reconnect the batteries.
7. Carefully lean tank into position.
8. Reinstall the Qty: (2) 5/16''-18x3'' bolt into the relief ports and tighten.
9. Reinstall the 3/16'' Allen wrench into its location.

2/16/2006

2023-04 RESETTABLE CIRCUIT BREAKER R&R

TIME REQUIRED: 30 MINUTES

NUMBER OF TECHS: 1 PERSON

REQUIRED PARTS: SELECT THE APPROPRIATE CIRCUIT BREAKER

- Qty: (1) actuator **2** amp resettable circuit breaker 7-837
- Qty: (1) brush motor **30** amp re-settable circuit breaker 290-9609
- Qty: (1) **HD** brush motor **40** amp re-settable circuit breaker 190-9609
- Qty: (1) vacuum motor **25** amp re-settable circuit breaker 190-8370

REQUIRED TOOLS

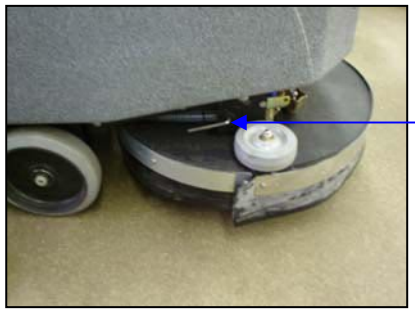
- # 2 Phillips screw driver
- Pliers
- Needle nose pliers
- 9/16''12-point deep well socket

COMPLETELY DRAIN SOLUTION & RECOVERY TANKS

MAKE SURE MACHINE IS ON LEVEL GROUND AND WHEELS ARE CHOCKED AND SCRUB DECK IS IN UP POSITION.

OPENING TANK

1. Locate and remove the 3/16'' Allen wrench on the right side of scrub deck. (see figure below)



2. Locate and remove the two 5/16''-18 x 3'' bolts that are in the relief ports on the left and right sides of machine. (see figure below)

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3. Carefully lean tank back to expose battery compartment.(see figure below)

DISCONNECT BATTERIES

1. Locate the positive terminal that is in front left of battery pack.
2. Using a 9/16'' 12- point socket loosen and remove the 5\16'' nut.
3. Remove the red wire and secure away from terminal.(See figure below)

REMOVING CONTROL PANEL

1. Using a # 2 Phillips head screw driver remove the Qty: (5) # 10x3/4'' Phillip pan head sheet metal screws from control panel. *NOTE: MARKED AS # 21 ON CONTROL PANEL DIAGRAM ON PAGE **3**.*
2. Remove the two # 8x3/4'' Phillip pan head sheet metal screws that are holding the recessed bumpers on to the control panel.

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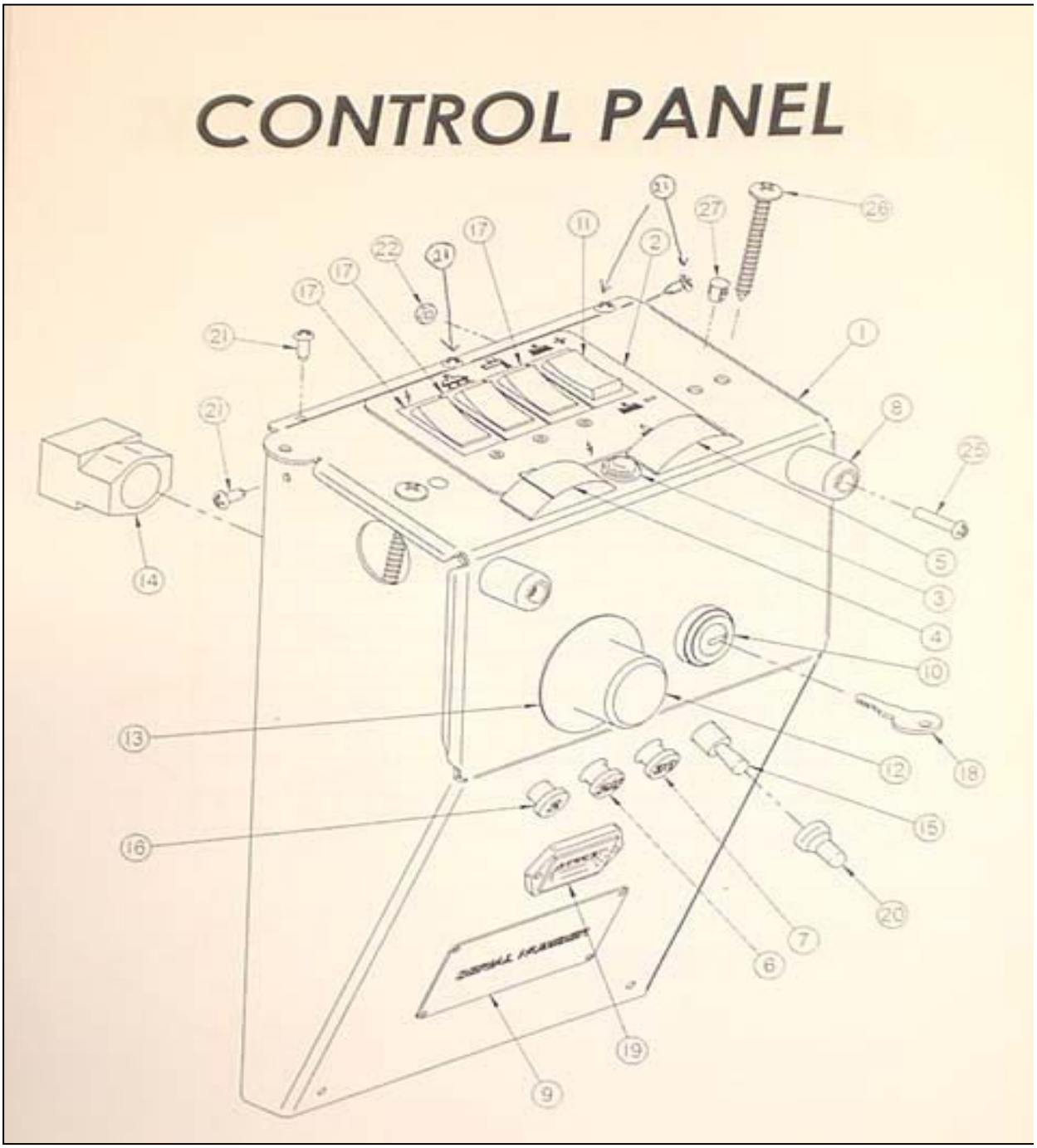
3. Remove the two # 14x2 ½'' sheet metal screws. NOTE: *MARKED AS # 26 BELOW.*



4. Carefully remove control panel.

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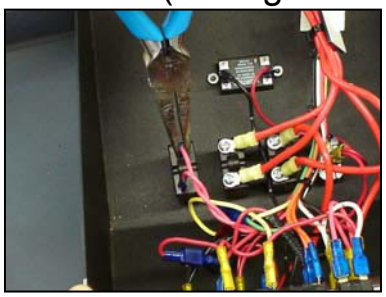
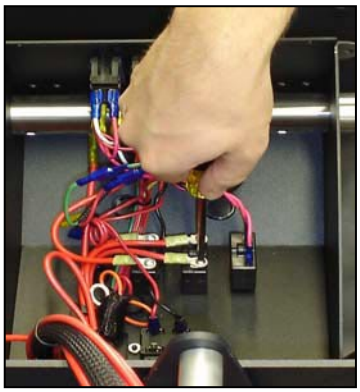
REMOVING THE **2** AMP RESETTABLE CIRCUIT BREAKER

1. Using a needle nose pliers carefully disconnect the two pink wires from the back of circuit breaker. *NOTE: MAKE SURE TO GRAB CONNECTORS NOT WIRES.* (see figure below)

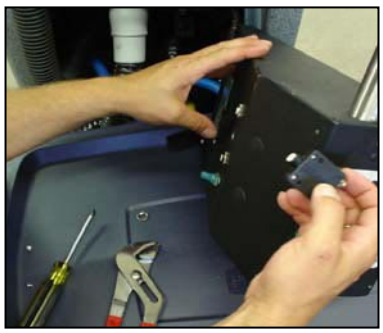


REMOVING THE **25, 30,** OR **40** amp RESETTABLE CIRCUIT BREAKER

1. Using # 2 Phillips screw driver carefully remove the Qty:(2) 8/32'' screws that hold the # 10 ring connectors to the circuit breaker. (see figure below)



2. Using pliers loosen and remove the knurled nut on the front of the control panel and remove the circuit breaker. (see figures below)



INSTALLING THE **2** AMP RESETTABLE CIRCUIT BREAKER

1. Install resettable circuit breaker and knurled nut.
2. Using a pliers carefully tighten the knurled nut snug.
3. Plug wires back into resettable circuit breaker

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4. Reinstall control panel.
5. Reconnect batteries.
6. Close tank and reinstall the 5/16'' – 18 x3'' bolt in relief ports and tighten using the 3/16'' Allen wrench.
7. Reinstall 3/16'' Allen wrench back in location.

INSTALLING THE **25, 30**.AND **40** AMP CIRCUIT BREAKER

1. Install resettable circuit breaker and knurled nut.
2. Using a pliers carefully tighten the knurled nut snug.
3. Using a # 2 Phillips screw driver reinstall and tighten the Qty: (2) 6/32'' Phillips head screws with the # 10 rings.
4. Reinstall control panel.
5. Reconnect batteries.
6. Close tank and reinstall the 5/16'' – 18 x3'' bolt in relief ports and tighten using the 3/16'' Allen wrench.
7. Reinstall 3/16'' Allen wrench back in location.

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TIME REQUIRED: 15 MINUTES

NUMBER OF TECHS: 1 PERSON

REQUIRED PARTS

- Qty: (2) 190-2110 battery,12 volt 140 amp AH,

REQUIRED TOOLS

- 9/16'' 12-point deep well socket
- ½'' 12-point socket
- volt meter
- battery terminal protector

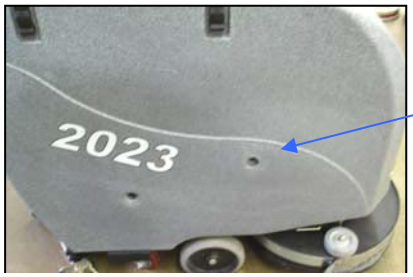
COMPLETELY DRAIN SOLUTION & RECOVERY TANKS

MAKE SURE MACHINE IS ON LEVEL GROUND AND WHEELS ARE CHOCKED AND SCUB DECK IS IN UP POSITION.

OPENING TANK

1. Locate and remove the 3/16'' Allen wrench on the right side of scrub deck. (see figure below)

2. Using the 3/16'' Allen wrench remove the Qty: (2) 5/16''-18 x 3'' bolts that are in the relief ports on the left and right sides of machine. (see figure below)

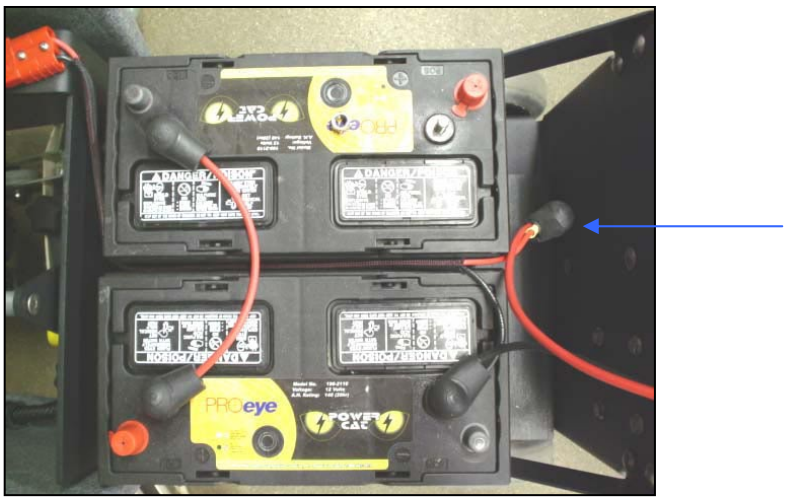


NOTE: IF MACHINE HAS KEY SWITCH, REMOVE KEYS BEFORE NEXT STEP.

3. Carefully lean tank back to expose battery compartment.(see figure below)

DISCONNECTING BATTERIES

1. Locate the positive terminal that is in front left of battery pack.
2. Using a 9/16'' 12- point socket loosen and remove the 5\16'' nut.
3. Remove the red wire and secure away from terminal .(See figure below)



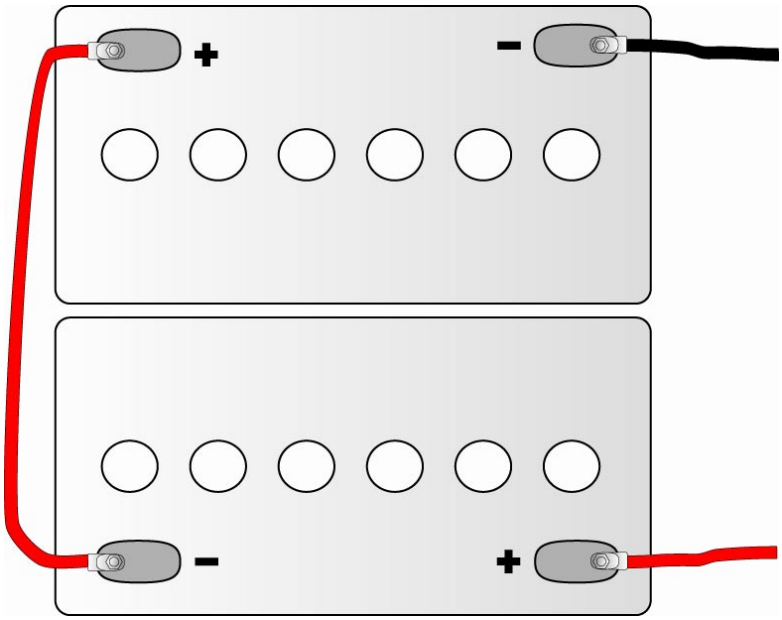
4. Remove remaining cables and set aside.

REMOVING THE BATTERIES

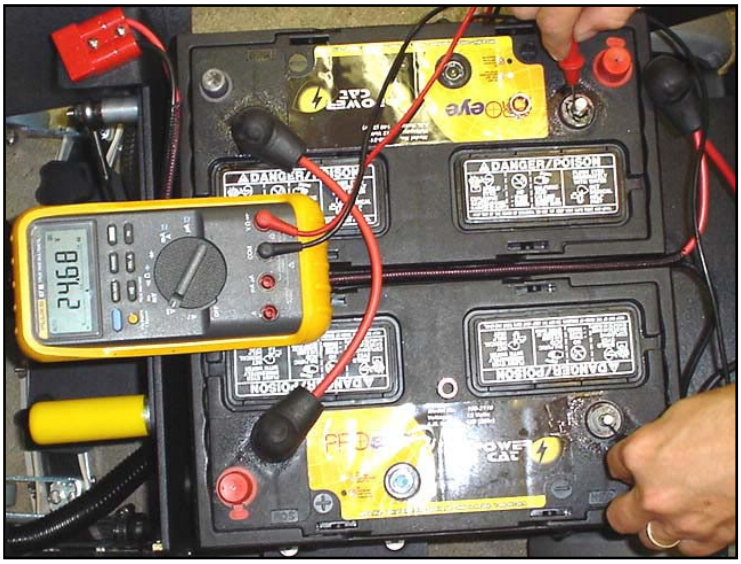
1. Remove the batteries. *NOTE: WHEN REMOVING BATTERIES KEEP ALL WIRES CLEAR FROM BATTERY TERMINALS!!!!*

INSTALLING NEW BATTERIERS

1. When installing new batteries make sure that the terminals are on the outside of the machine.
2. Reconnect the jumper wire. *NOTE: MAKE SURE NOT TO OVER TIGHTEN CONNECTTION.(see figure below)*



3. Using a voltage meter check voltage between the negative and positive terminal. Voltage should be 24 volts or slightly higher. (see figure below)



4. Reconnect the red wire on the front left positive terminal of the battery pack. *NOTE: MAKE SURE NOT TO OVER TIGHTEN CONNECTION*

5. Reconnect the black wire on the front right negative terminal of battery pack. *NOTE: MAKE SURE NOT TO OVER TIGHTEN CONNECTION.*

6. Spray terminals with battery terminal protector.

7. Replace battery terminal covers.

8. Close tank and reinstall the 5/16'' – 18 x3'' bolt in relief ports and tighten using the 3/16'' Allen wrench.

9. Reinstall 3/16'' Allen wrench back in location.

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2023-06 Cleaning Solution Filter

TIME REQUIRED: 15 MINUTES

NUMBER OF TECHS: 1 PERSON

REQUIRED PARTS
None

REQUIRED TOOLS

- One pair of rubber gloves

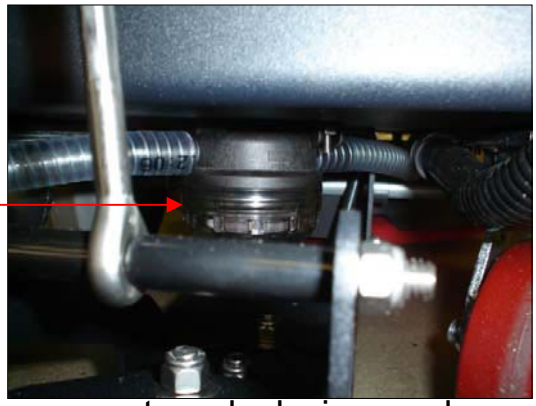
COMPLETELY DRAIN SOLUTION TANK

PLACE MACHINE ON LEVEL GROUND AND CHOCK WHEELS.

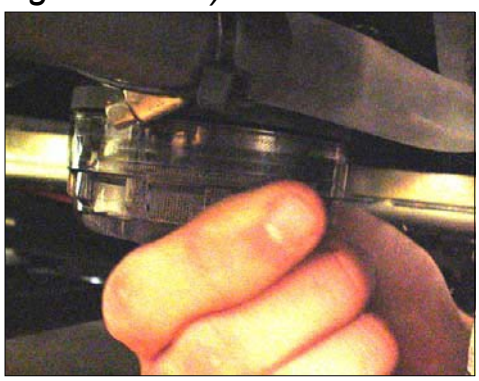
REMOVING FILTER

1. Filter is located at the rear bottom side of the machine,
2. Access to filter is in front of squeegee swing plate. (*see figure below)*

Inline filter



3. Unscrew cover counter- clockwise, and remove the filter screen. (*see figure below)*



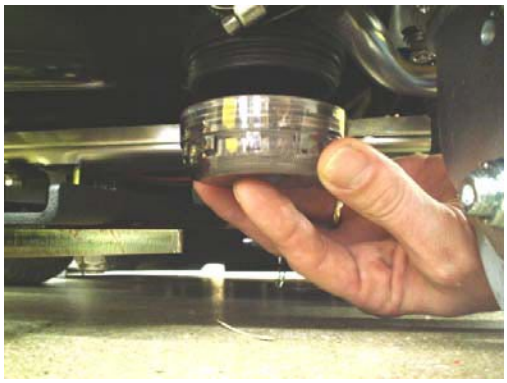
CLEANING FILTER SCREEN

1. Rinse filter screen and clear cover until clear of debris. (*see figures below)*

Note: Check threads on cover and filter screen housing for debris.

INSTALLING CLEAN FILTER SCREEN

1. Place filter screen in center of clear filter screen cover. Install filter screen and clear filter screen cover on to housing and tighten. (*see figures below*)



2. Fill solution tank with water.(*check for leaks)*

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2023-07 SQUEEGEE TOOL R&R

TIME REQUIRED: 15 MINUTES

NUMBER OF TECHS: 1 PERSON

REQUIRED PARTS

- SEE PARTS MANUAL FOR SQUEEGEE KIT PART #

REQUIRED TOOLS

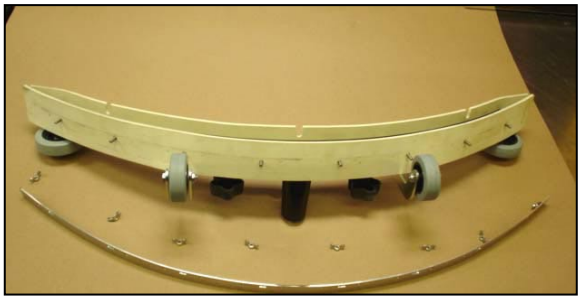
- 7/16'' 12- point box wrench
- 7/16'' 12- point deep well socket
- # 2 Philips screw driver

NOTE: THE REAR SQUEEGEE BLADE IS DESIGNEDTO BE FLIPPED OVER SO ALL FOUR EGDES CAN BE USED.

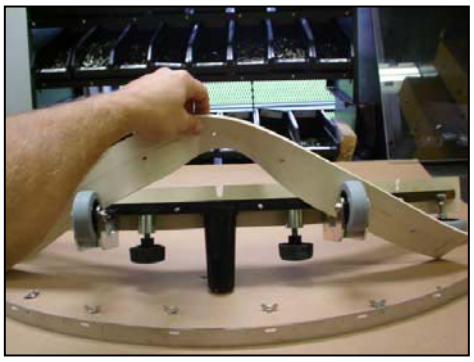
REMOVING SQUEEGEE TOOL BLADES

1. Using a # 2 Philips screw driver hold the # 10-32 screws and remove wing nuts. (See figure below) *NOTE: SET WING NUTS DOWN IN THE ORDER YOU TAKE THEM OFF!!!*

2. Remove rear squeegee tool band. (see figure below)

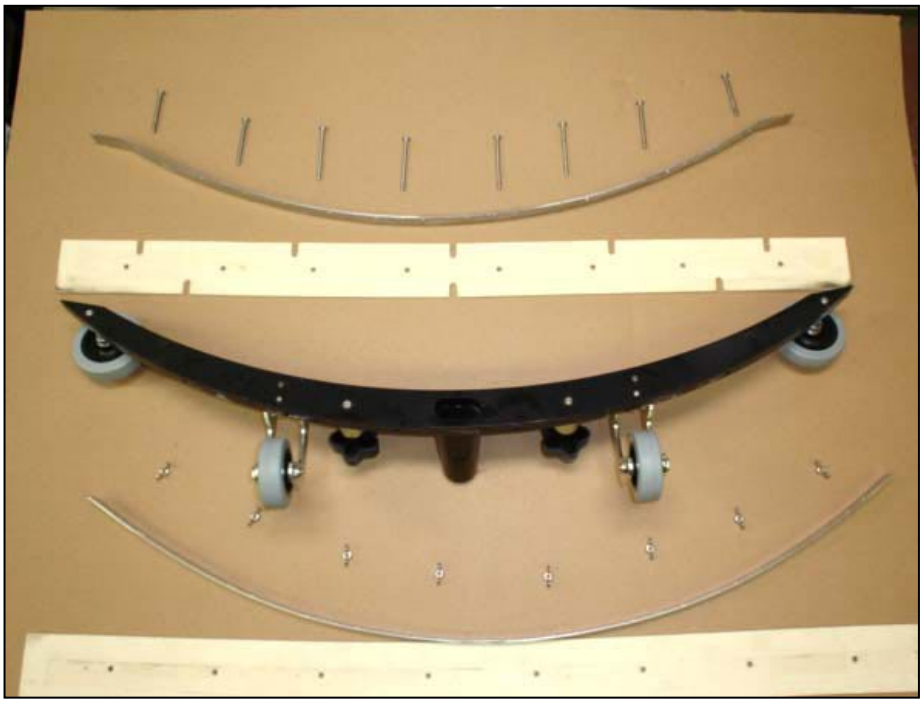


3. Remove rear squeegee blade.(see figure below)



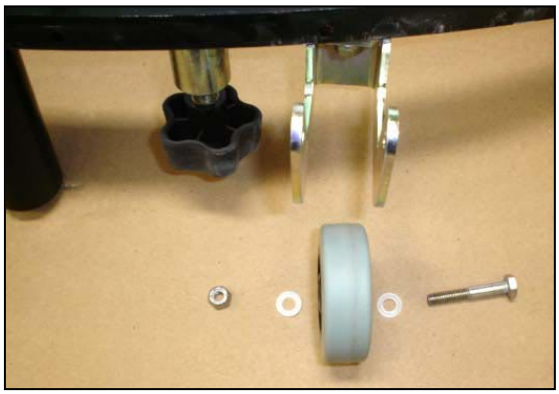
4. Remove the Qty: (8) # 10-32'' screws and front squeegee tool band. (see figure below) *NOTE: SET SCREWS DOWN IN THE ORDER YOU TAKE THEM OUT. THEY VARY IN LENGTH.*

5. Remove the front squeegee tool blade. (see figure below)



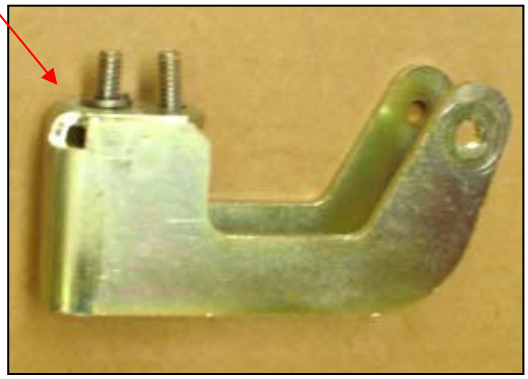
REMOVING SQEEGEE TOOL TRAIL WHEELS

1. Using a 7/16'' 12-point box wrench and a 7/16'' 12-point socket loosen and remove the ¼'' -20 x 1 5/8'' bolt and ¼'' 20 jam nylock nut and Qty: (2) ¼'' nylon flat washers. (see figure below)



REMOVING TRAIL WHEEL MOUNT

1. Using a 7/16'' 12-point deep well socket loosen and remove the Qty: (2) ¼ -20 x 1'' bolts that hold down the trail wheel mount to the squeegee tool. There is a 1/4''- 20 lock washer under the front bolt, this washer is for the correct angel of the trail wheel mount. (see figure below)



INSTALLING TRAIL WHEEL MOUNT

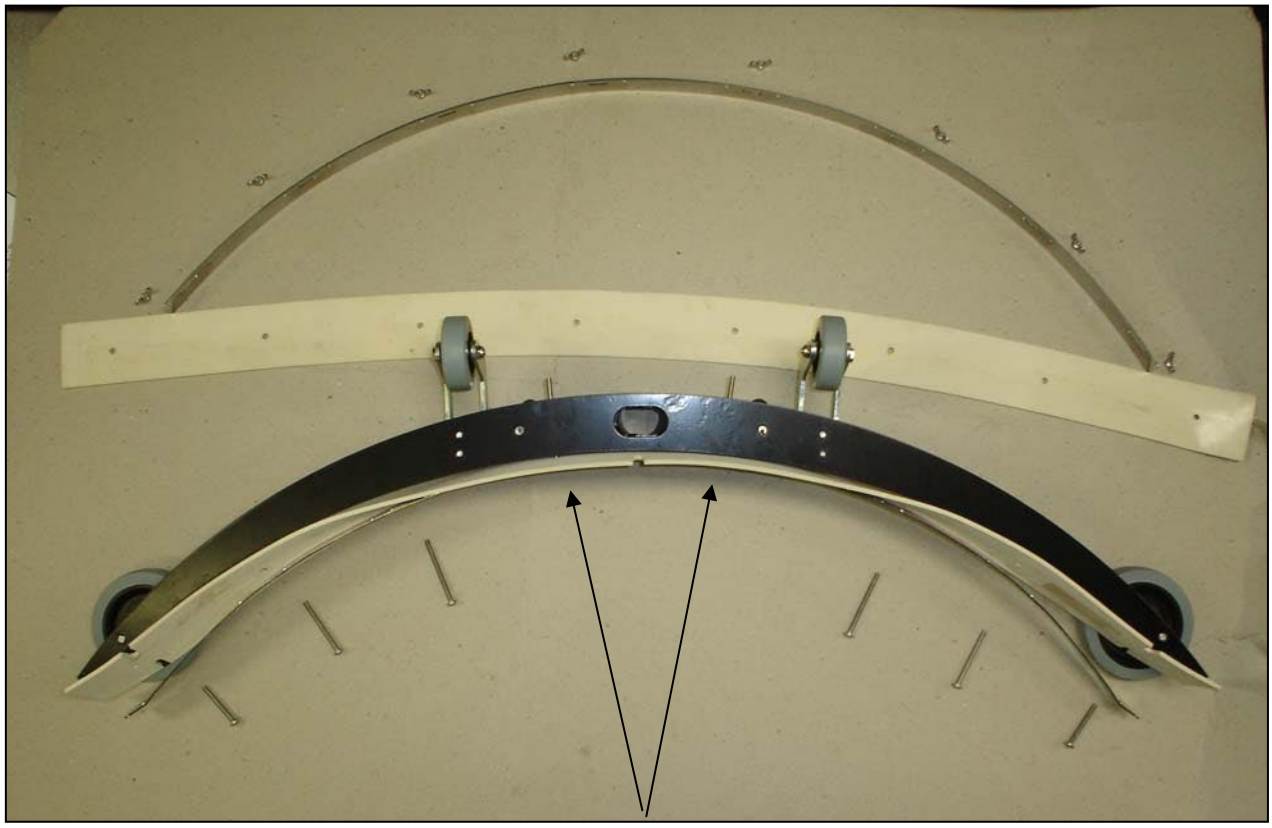
1. Make sure that the ¼'' lock washer is under the rear bolt and use a 7/16'' 12-point deep well socket and tighten the front bolt first and then tighten the rear one next. *NOTE: DON'T OVER TIGHTEN.*

INSTALLING NEW SQUEEGEE TOOL TRAIL WHEEL

1. Hold trail wheel into position and install ¼'' – 20 x 1''5/8'' bolt and ¼'' nylon flat washers and ¼''-20 nylock nut and tighten so wheel spins freely.

REINSTALLING SQUEEGEE TOOL BLADES & BANDS

1. Install the Qty: (2) center screws into the squeegee tool band and the squeegee tool front blade and install onto the squeegee tool.(see figure below)



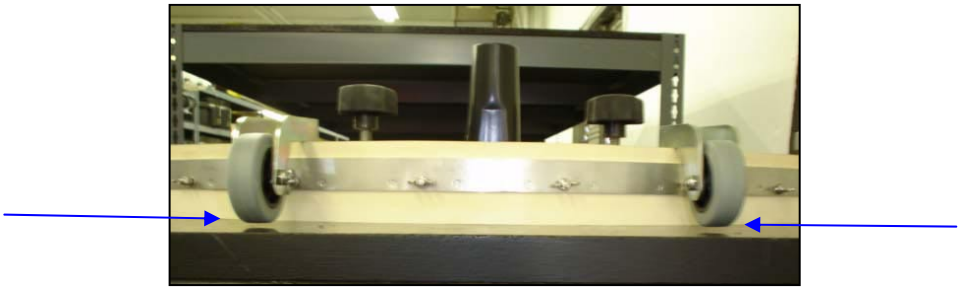
2. Install the remainder of the screws from the inside to the out side.

3. Install the rear squeegee tool blade and band.

4. Install the wing nuts on loosely.

5. Then starting from the center two screws hand tighten in the order shown below.

6. Set squeegee on level flat surface and check to make sure the trail wheels are the same distance from the surface. Most are adjusted ¼'' to ½'' from surface. If this is not an even amount squeegee will not perform correctly. (see figure below)



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